ESTTA Tracking number: **ESTTA511446**

Filing date: **12/17/2012**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE TRADEMARK TRIAL AND APPEAL BOARD

Proceeding	92054573
Party	Defendant Ortronics, Inc.
Correspondence Address	MARK D GIARRATANA MCCARTER & ENGLISH LLP 185 ASYLUM STREET, CITYPLACE 1 HARTFORD, CT 06103 UNITED STATES mgiarratana@mccarter.com, rrundelli@calfee.com, jcastrovinci@calfee.com, ssmith@mccarter.com, jwhitney@mccarter.com
Submission	Other Motions/Papers
Filer's Name	Mark D. Giarratana
Filer's e-mail	mgiarratana@mccarter.com, shsmith@mccarter.com
Signature	/s/Mark D. Giarratana
Date	12/17/2012
Attachments	Exhibit U to Smith Dec.pdf (14 pages)(4394691 bytes) Exhibit V to Smith Dec.pdf (2 pages)(21613 bytes) Exhibit W to Smith Dec.pdf (19 pages)(1581333 bytes) Exhibit X to Smith Dec.pdf (49 pages)(2662058 bytes) Exhibit Y to Smith Dec.pdf (25 pages)(921530 bytes) Exhibit Z to Smith Dec.pdf (4 pages)(192090 bytes)

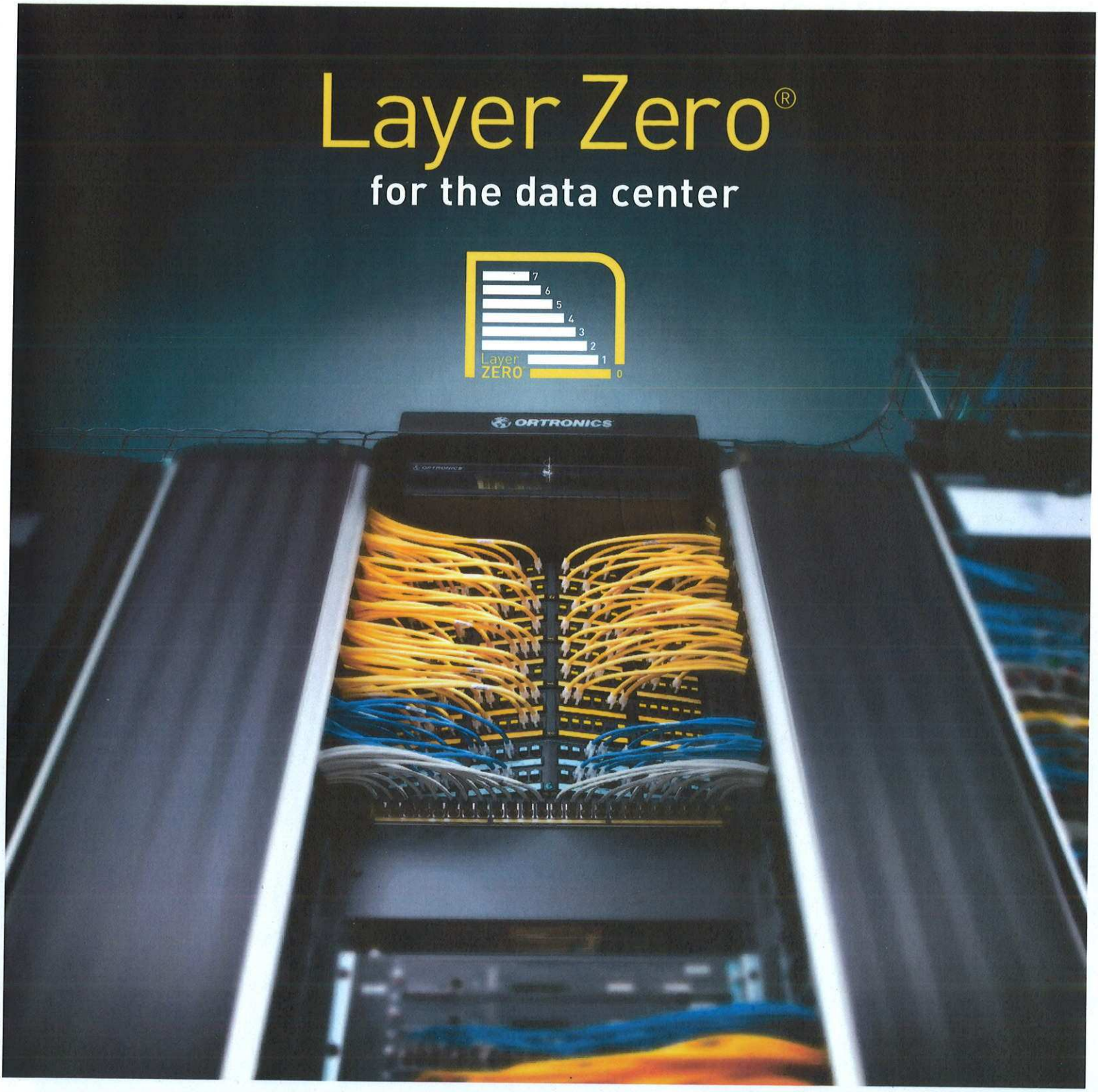
EXHIBIT U

Cancellation Proceeding No. 92054573
LayerZero Power Systems, Inc. v. Ortronics, Inc.

Exhibit Offered by Ortronics, Inc.

Layer Zero®

for the data center



legrand®

Ortronics

PREPARE FOR THE FU

Data centers are the foundations of enterprises, vital to the daily operation of the entire organization - they no longer simply store data. Virtualization, smart buildings, unified computing systems and cloud computing have combined to make the data center the neural hub of the company. Consequently, networks require greater security, storage capacity and more in-depth processing to support their expanded roles.

OPPORTUNITIES FOR THE DATA CENTER

These demands necessitate a holistic approach to data center design to ensure next generation technology compatibility, enable virtualization and maximize network availability. Legrand | Ortronics provides a comprehensive approach to the physical infrastructure with the introduction of Layer Zero® solutions.

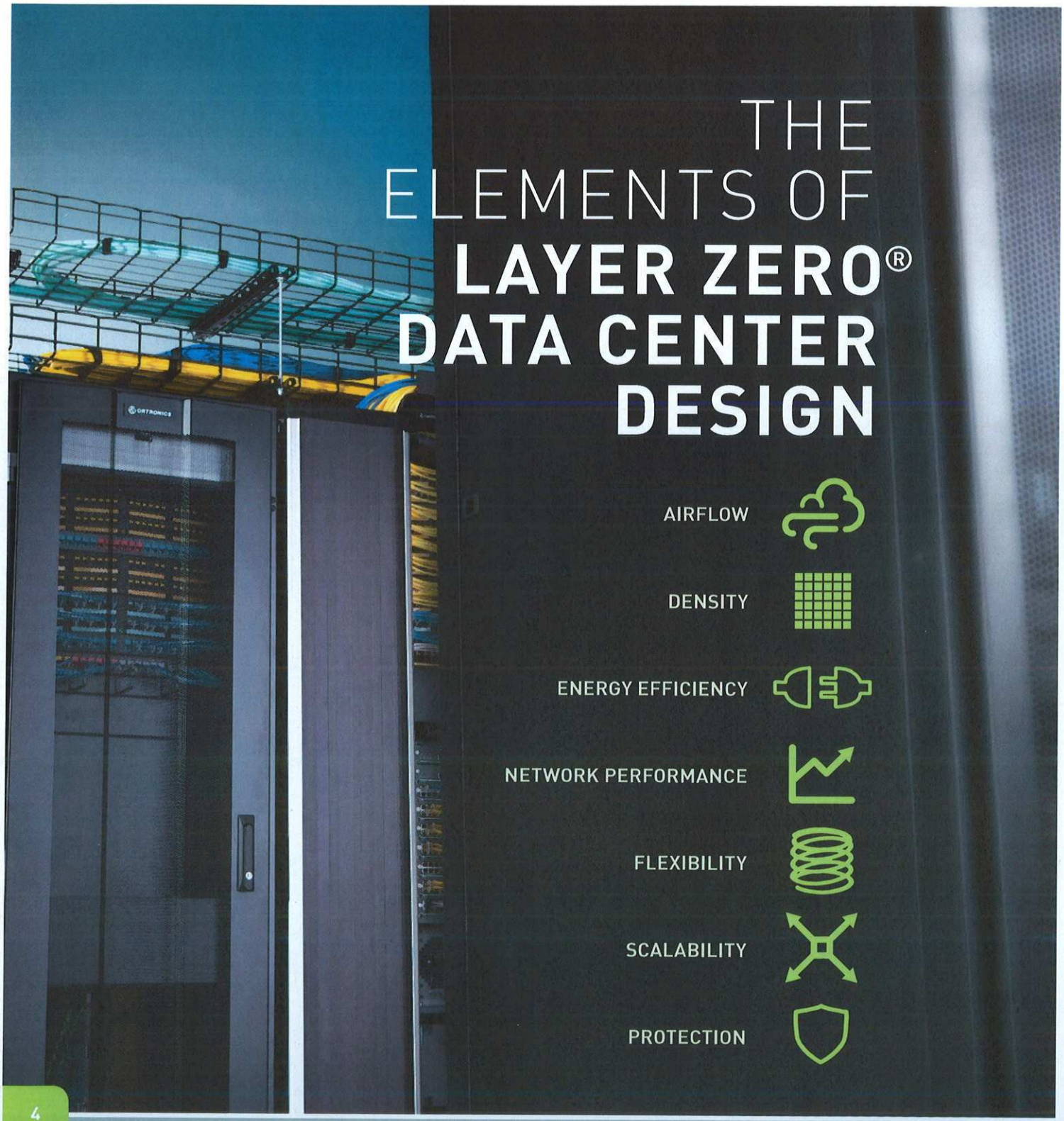
TURE

Layer Zero® - the Infrastructure Layer™, stabilizes the network

The ISO/OSI model divides the network communications process into 7 layers across network architecture. Layers 7 through 4 relate to end-to-end communications between data source and destinations. Layers 3 through 1 pertain to communications between network devices. Layer Zero, the proposed infrastructure layer for the ISO/OSI Network model, addresses the critical need for superior physical infrastructure support in the data center.

Layer Zero solutions encompass the entire physical infrastructure that supports your network, including racks, cabinets, advanced cable management, pathway solutions, underfloor and overhead systems.

By recognizing the importance of the underlying infrastructure layer and emphasizing best practices in pathway and physical support design, a new level of stability can be created for the network.



THE ELEMENTS OF LAYER ZERO® DATA CENTER DESIGN

AIRFLOW

DENSITY

ENERGY EFFICIENCY

NETWORK PERFORMANCE

FLEXIBILITY

SCALABILITY

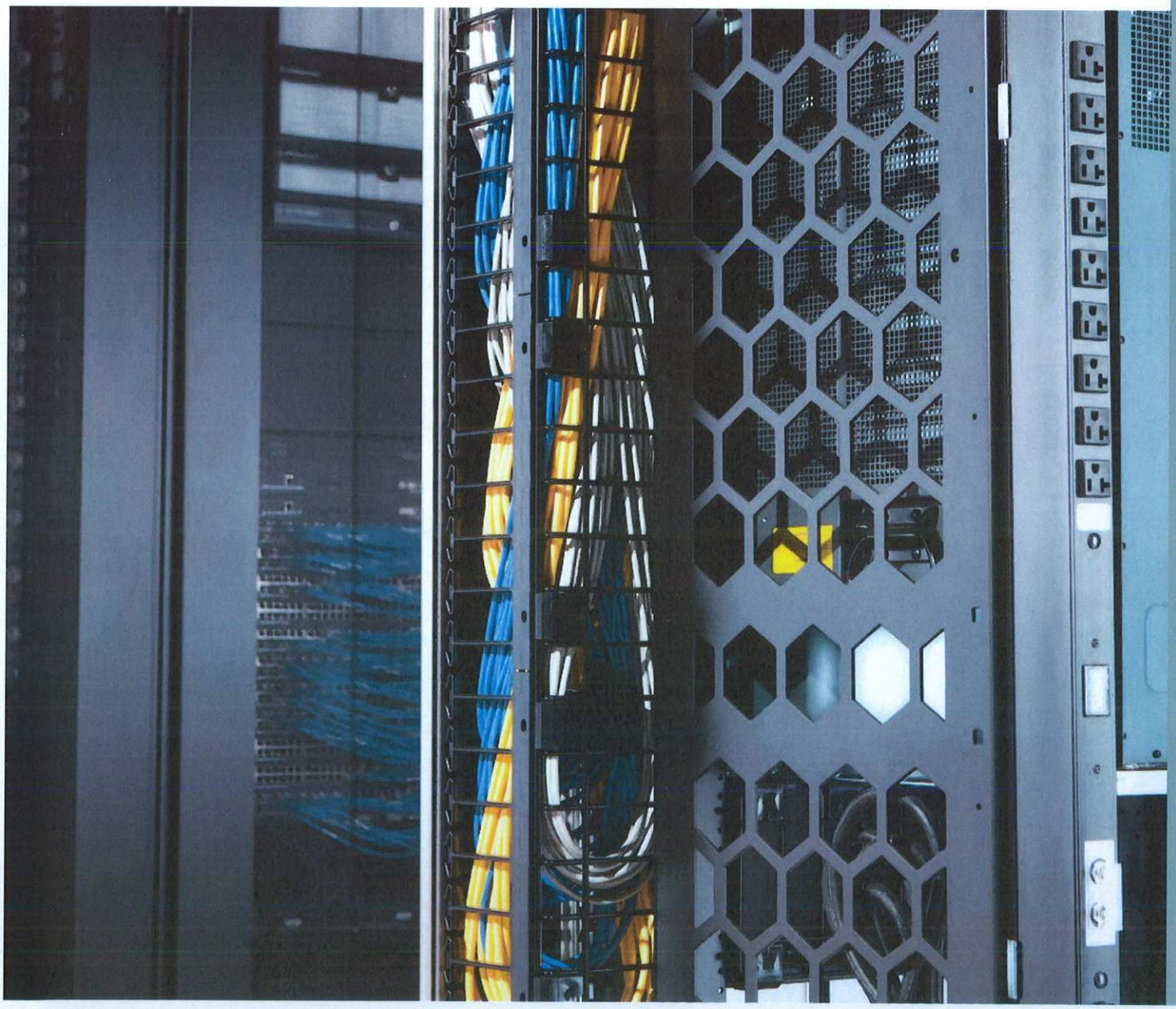
PROTECTION

AIRFLOW

Excessive heat is the primary enemy of most networking equipment.

Heat exhaust recirculation and hot spots are fundamental challenges for data center managers, threatening the life span of network equipment if left unmanaged.

Layer Zero® infrastructure solutions manage heat and airflow across the entire network. They leverage the natural properties of hot and cold air to ensure proper ventilation and alleviate the heat that can contribute to equipment failure. It is critical to establish best practices during the physical infrastructure design phase in order to improve overall thermal management.



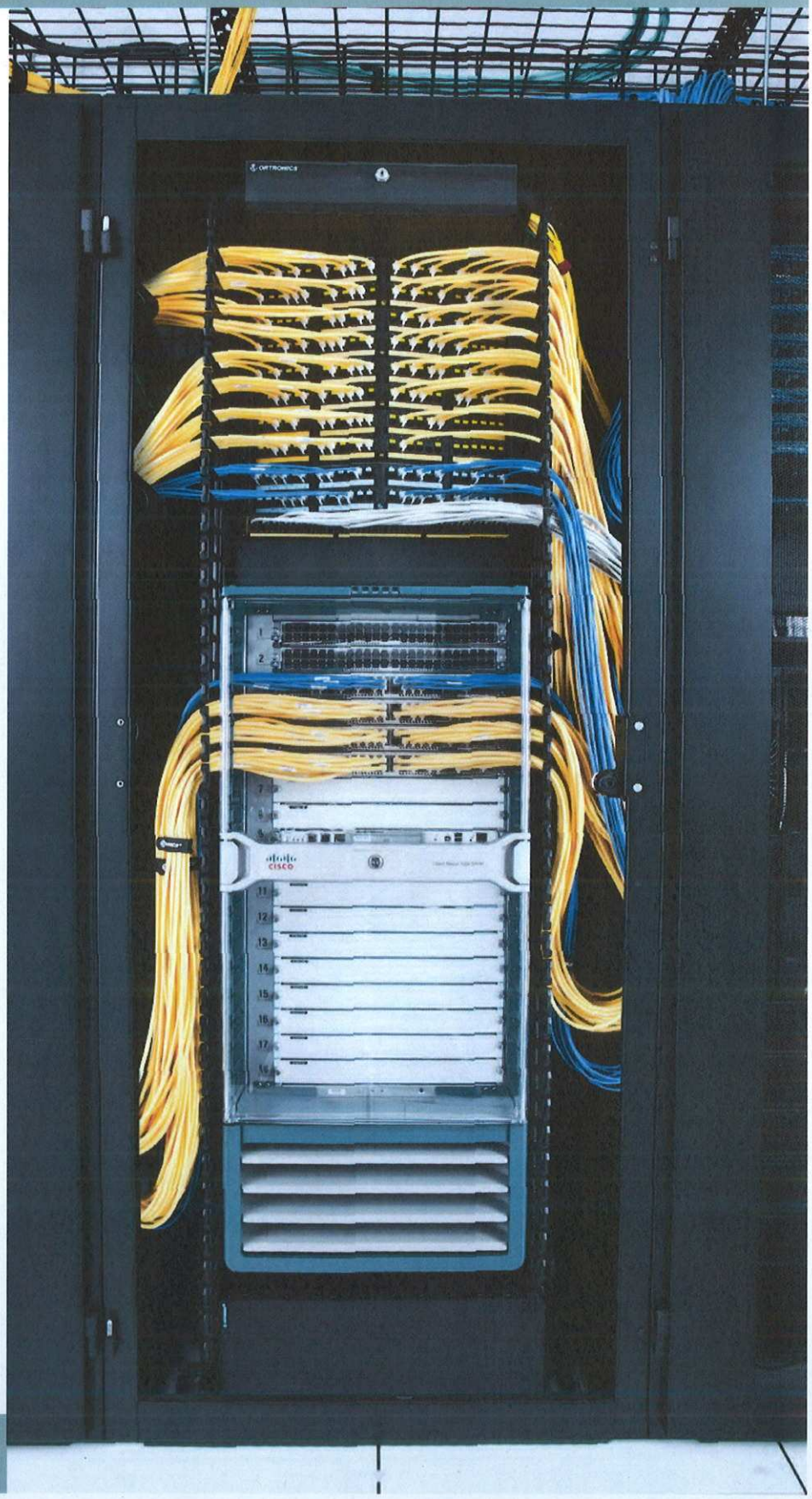
THE ELEMENTS OF LAYER ZERO® DATA CENTER DESIGN

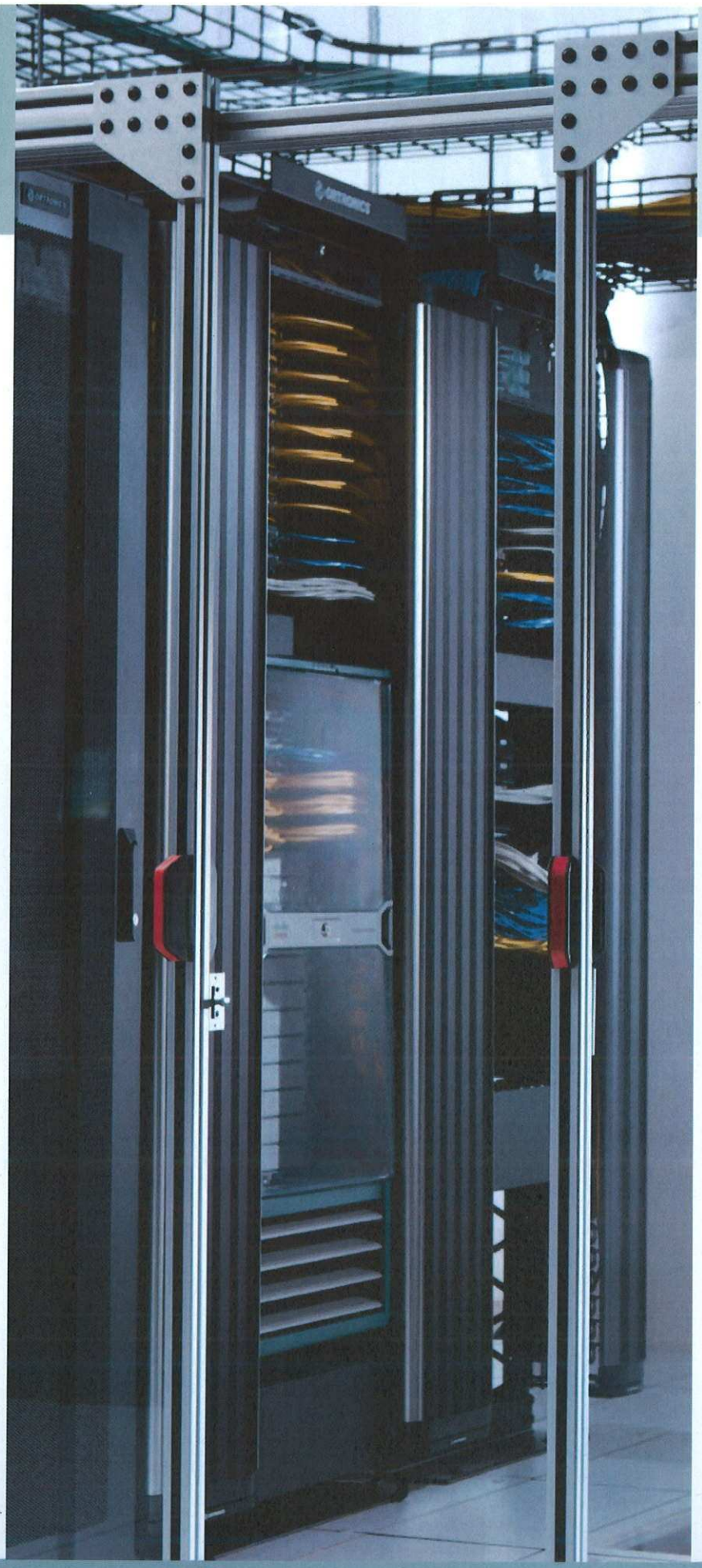
DENSITY

As chip power increases and density capacity rises, power requirements and heat output are concentrated to smaller areas.

The density demands of virtualization, convergence and consolidation can increase the power consumption of a single rack to 20kW or higher. Such an increase of power, without an increase of CRAC capacity, can drive energy costs up by dramatically driving the efficiency of conventional air conditioning systems down.

Layer Zero solutions help optimize network real estate by accommodating for higher density equipment. Cabinets and racks have ample space and static capacity for the latest switching equipment while implementing passive thermal management to balance the additional load.





ENERGY EFFICIENCY

Passive cooling is the most energy efficient way to manage airflow and thermal loads in the data center.

True passive cooling systems lower the ambient room temperature without introducing the additional power consumption of fans. Adding fans both increases and decreases the power load at the same time. Power assisted fans reduce the power load by creating better airflow management, yet some of the reduced power load is diverted to the fans, thereby reducing the overall savings.

Legrand | Ortronics physical support systems use completely passive thermal management to increase airflow efficiency. Product innovations re-direct side venting equipment into the standard hot aisle / cold aisle configuration and reinforce the effectiveness of the aisle separation.

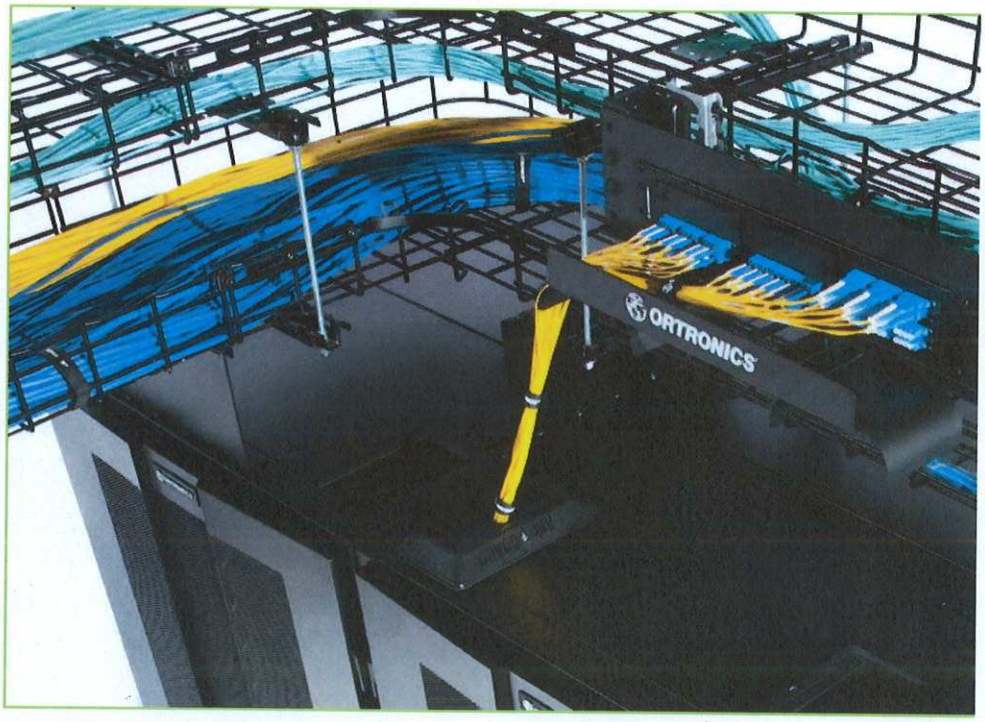
THE ELEMENTS OF LAYER ZERO® DATA CENTER DESIGN

NETWORK PERFORMANCE

It is critical to the network to minimize signal loss to maximize system performance.

Excessive bending, kinking or allowing too much force to be exerted on the cables can negatively impact ethernet network performance. A switch loaded with inadequately managed patch cords can damage the ports over time. The cost of replacing an individual patch cord is negligible, but a single damaged equipment port cannot be repaired. Replacing a damaged switch card is a costly and preventable event.

Layer Zero infrastructure products protect network performance by providing proper support for network equipment. By maintaining the integrity of the equipment, Layer Zero solutions are able to help reduce capital expenditures.



FLEXIBILITY

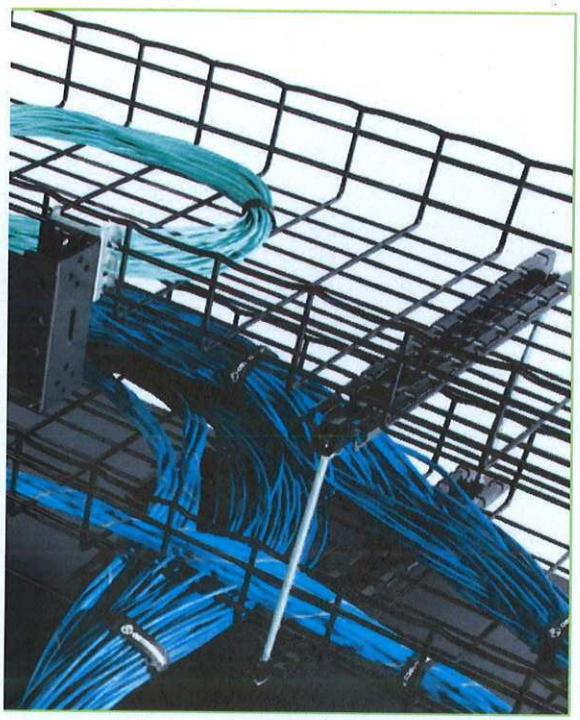
Effective space utilization requires an infrastructure that is agile and can adapt to changing environmental conditions.

A well thought out Layer Zero infrastructure assures a flexible physical design that will support technology demands from the physical layer.

Ortronics® solutions are fully modular and are configurable to suit the needs of your specific installation. They can be adjusted even after installation, mitigating the impact of MAC work. Ortronics solutions are optimized for copper and fiber optic connectivity, as well as heavy equipment.

SCALABILITY

Data centers require infrastructure solutions that can be quickly and seamlessly reproduced, without disrupting the flow of business.



The faster new equipment can be deployed and brought online, the greater the cost savings to the network manager.

Layer Zero solutions are scalable, able to facilitate growth without creating major disruptions. Solutions can be designed for current business needs with ease and still be able to support future expansions in a timely and cost effective way.

PROTECTION

Protecting the network means securing all elements, not just switches and servers.

Layer Zero solutions offer a comprehensive way to protect your network equipment:

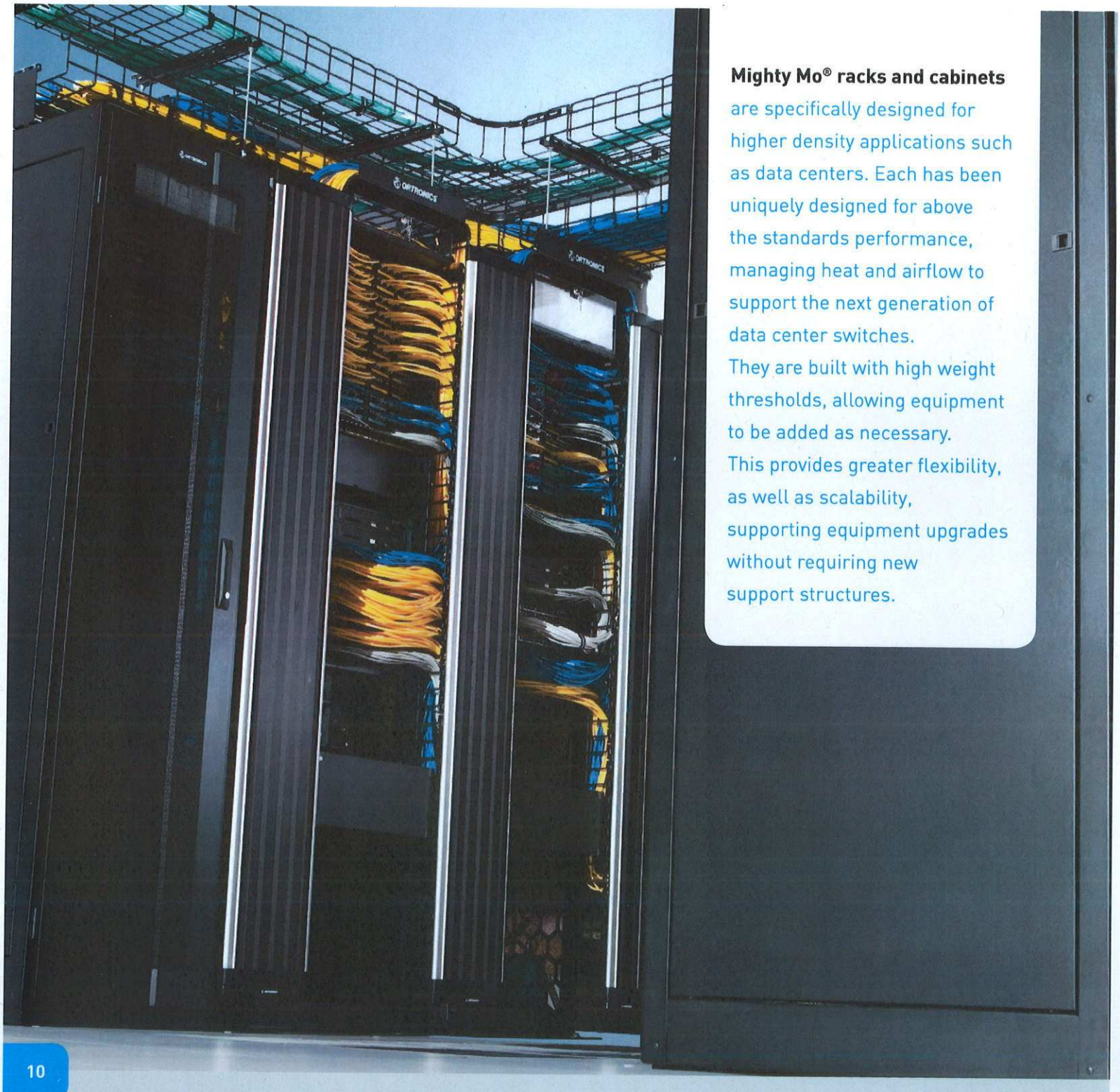
- Physical security, such as preventing unauthorized access to servers
- Protecting network performance by safeguarding the integrity of the cables
- Monitoring current for power surges and temperature for hot spots

Each product integrates with each other, creating a unified system that provides complete protection from threats to your network.

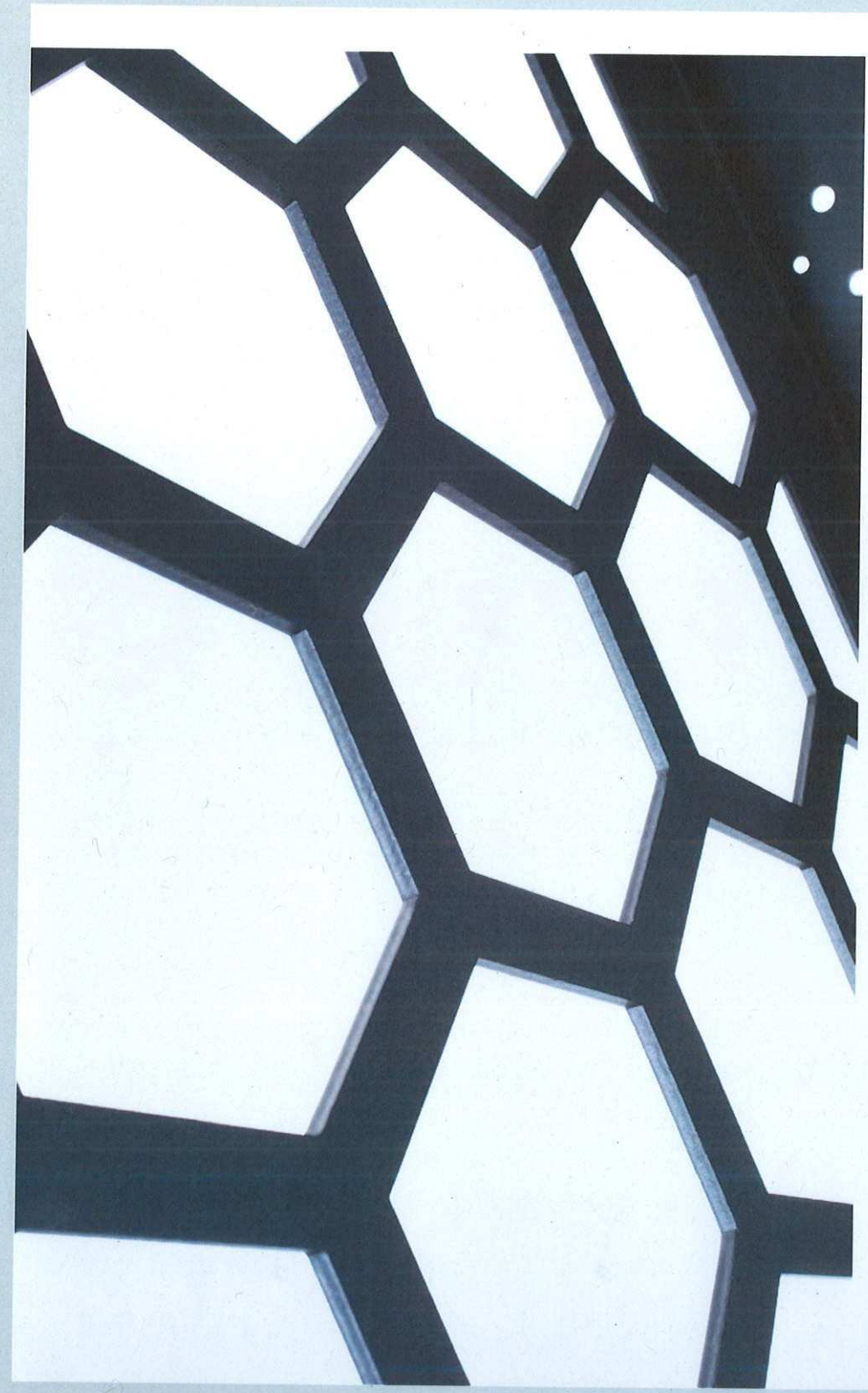
legrand® | Ortronics

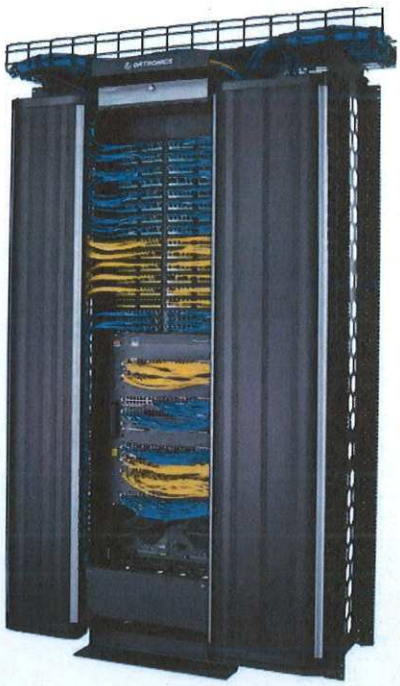
PRODUCT SOLUTIONS FOR A LAYER ZERO® DESIGN

RACKS & **CABINETS**



Mighty Mo® racks and cabinets are specifically designed for higher density applications such as data centers. Each has been uniquely designed for above the standards performance, managing heat and airflow to support the next generation of data center switches.
They are built with high weight thresholds, allowing equipment to be added as necessary.
This provides greater flexibility, as well as scalability, supporting equipment upgrades without requiring new support structures.





Mighty Mo® Racks

The Mighty Mo 10 rack features patented honeycomb side rails. The wide perforations allow better airflow for side venting equipment, mitigating the effect of exhaust heat.

The Mighty Mo 10 rack is built with cable management waterfalls to route cable to and from overhead trays. The Mighty Mo waterfalls are designed with bend limiting curves to ensure that cable are properly supported.

The frame is constructed of 14 ga. steel and aluminum with a 1,500 lb static frame load capacity.

PRODUCT SOLUTIONS FOR A LAYER ZERO® DESIGN

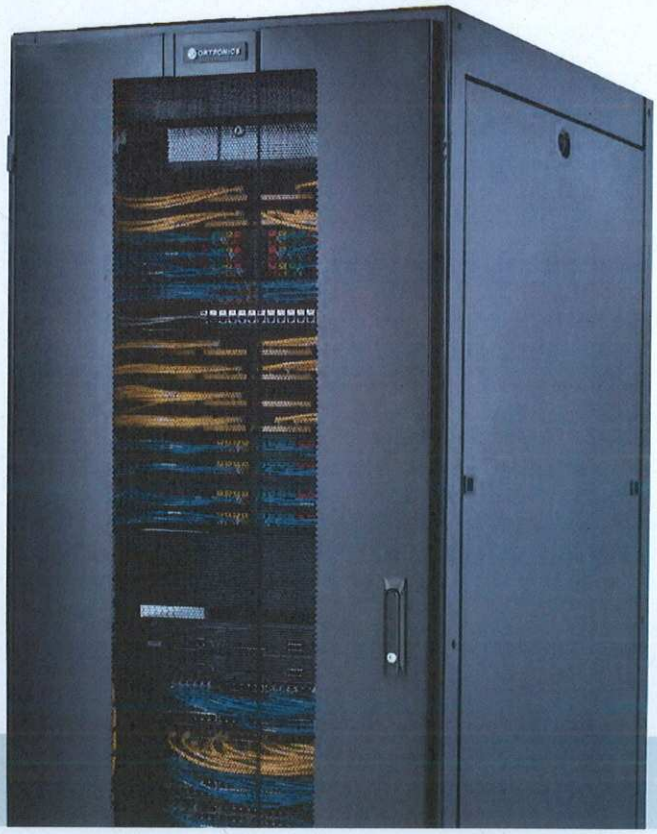
RACKS & CABINETS

Mighty Mo® GX Cabinets

The Mighty Mo GX Cabinet is fully modular and configurable to suit the needs of your specific installation. Each cabinet can be assembled with as few or as many accessories as needed to properly support your servers, switches and patch panels. The cabinets are designed to stand alone or easily gang together, as your network demands increase.

It is available in 29 different frame sizes and two colors, black or white.

The Mighty Mo GX Cabinet Series is Made in the USA.

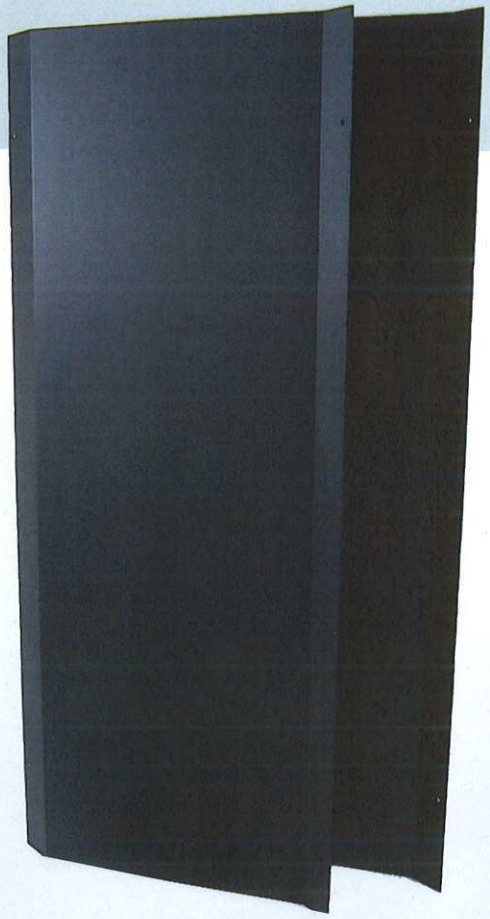


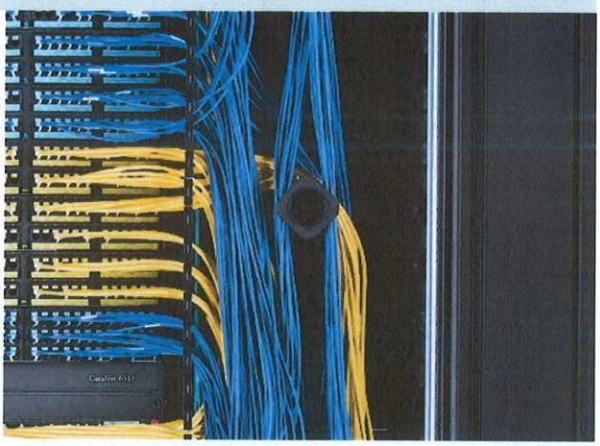
Mighty Mo® Cabinets

Legrand | Ortronics is a verified cabinet vendor for the Cisco Nexus 7010 and 7018 data center switches.

Mighty Mo cabinets can be fully customized. The cabinet arrives fully assembled, built to specification with your selected mounting rails, doors, panels and accessories installed. The frame is designed to route cable openings, pathways and management where they are needed: in the front for networking equipment and in the back for server equipment.

The frame has a 3,000 lb static load capacity to support the demands of high density applications.





Mighty Mo Cable Management

Mighty Mo cable managers allow up to 48 Category 6a or 6 patch cords per rack unit on a single side of the rack or cabinet. Deeper cable channels provide ample room for cables, even when the switch is loaded to capacity. Ortronics® Mighty Mo cable managers are optimized to organize patch cords vertically and horizontally, with a larger finger design that encourages defined and traceable routing of individual patch cords. The cable managers extend beyond the face of the switch to create a smoother bend radius as the patch cords are routed to the side, reducing stress on switch ports. These features organize cable bulk and allow for more patch cords per rack unit, while still increasing cooling efficiency.

Mighty Mo® Airflow Baffles

Mighty Mo airflow baffles isolate and direct intake and exhaust air from the cold aisle to the hot aisle more effectively. The baffles, combined with the Mighty Mo cabinet or rack system, maximize the airflow of network equipment.

EXHIBIT V

Cancellation Proceeding No. 92054573
LayerZero Power Systems, Inc. v. Ortronics, Inc.

Exhibit Offered by Ortronics, Inc.

Layer Zero™, the Infrastructure Layer, and High-Performance Data Centers

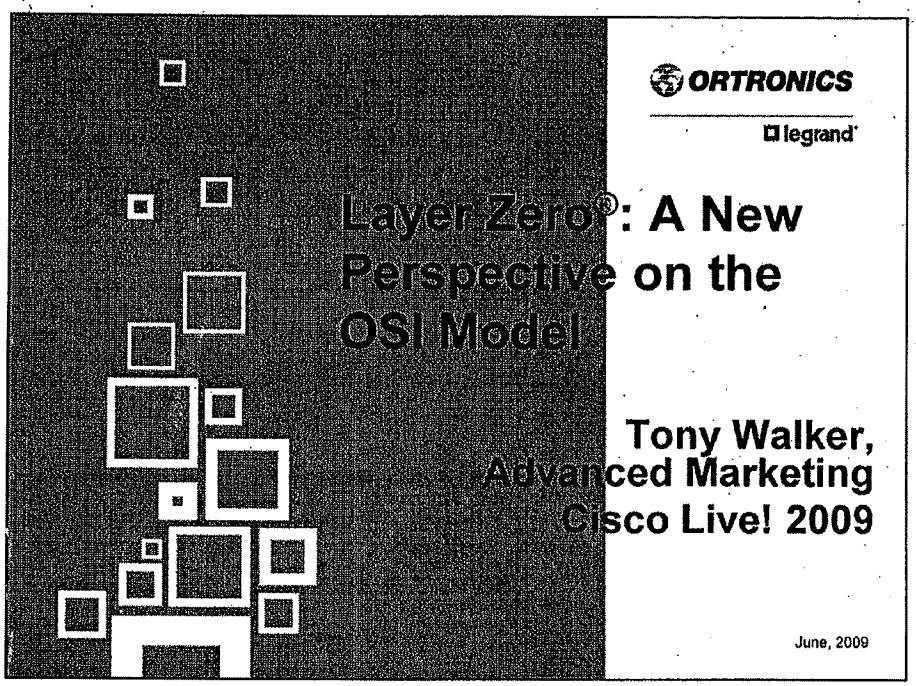
legrand®

Ortronics

EXHIBIT W

Cancellation Proceeding No. 92054573
LayerZero Power Systems, Inc. v. Ortronics, Inc.

Exhibit Offered by Ortronics, Inc.


ORTRONICS
legrand
Layer Zero®: A New Perspective on the OSI Model
Tony Walker, Advanced Marketing
Cisco Live! 2009
June, 2009

Agenda

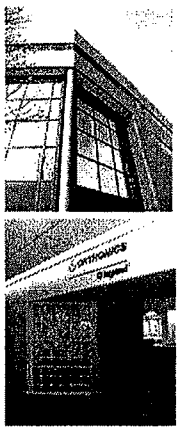
- Overview of Ortronics/Legrand
- Overview of Legrand, SA
- OSI Model Review
- Introduction of Layer Zero®
- Layer Zero® Impact on Data Center Issues
- Conclusion & Questions

Ortronics/Legrand

- A global leader with over 40 years experience in providing data communications networking solutions
  - Copper/Fiber Connectivity
  - Server racks and cabinets
  - Residential/MDU systems
  - Wireless
- Sales offices in USA, Canada, Latin America, Europe and Asia
- Product facilities in the USA, Mexico and Asia
- Corporate Responsibility
  - Commitment to Environmental Awareness & Sustainable Development
    - ISO 14001 Registered Facilities

ORTRONICS

legrand

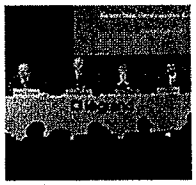


Headquartered in New London, Connecticut

Legrand, SA

- A world leader in residential housing and commercial building products and systems for electrical installations and information networks
- $5.5 B in net sales in 2008
  - Over $1 B (x2 in 5 years) net sales in emerging countries
- Legrand, SA employs 35,000 people globally, with operations in 70 locations worldwide and sells in more than 160 countries

ORTRONICS legrand



ORTRONICS legrand · VAN GEEL legrand · WIREMOLD legrand · VANTAGE legrand · Pass & Seymour legrand

bticino · WattStopper legrand · CABLOFIL legrand · on-Q legrand · HDL

Information Technology Challenges

- Today's digital networking users continue to ask for better processing performance, improved access and lower latency
- At the same time, shrinking IT budgets are increasing cost pressures
- Smooth migration to new technologies is expected with minimum disruption & down time

Expanding Objectives for IT and Facility Managers

ORTRONICS

legrand

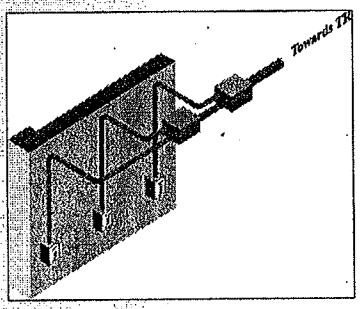
- IT managers' responsibilities are expanding along with the addition of applications like VoIP, security and building automation systems
  - More applications increase the burden on network performance and availability
- Facility managers are tasked with using existing Information Transport Systems (ITS) to support these expanding application demands

ORTRONICS

legrand

Increasing Installation Demands

- Traditional work areas designed to support 10BaseT will need upgrading to support high bandwidth networking
- Existing pathways were designed and installed prior to today's rapid network application expansion
- Cabling system design and installation practices impact critical bandwidth capacity

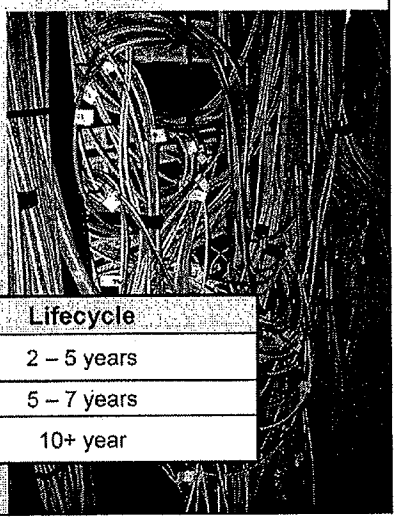


IT Infrastructure Support Challenges

ORTRONICS

legrand

- There is a misalignment between Information Transport Systems (ITS) capacity, its design and the IT equipment it supports.
- The physical layer is replaced or upgraded less frequently than the equipment it supports.



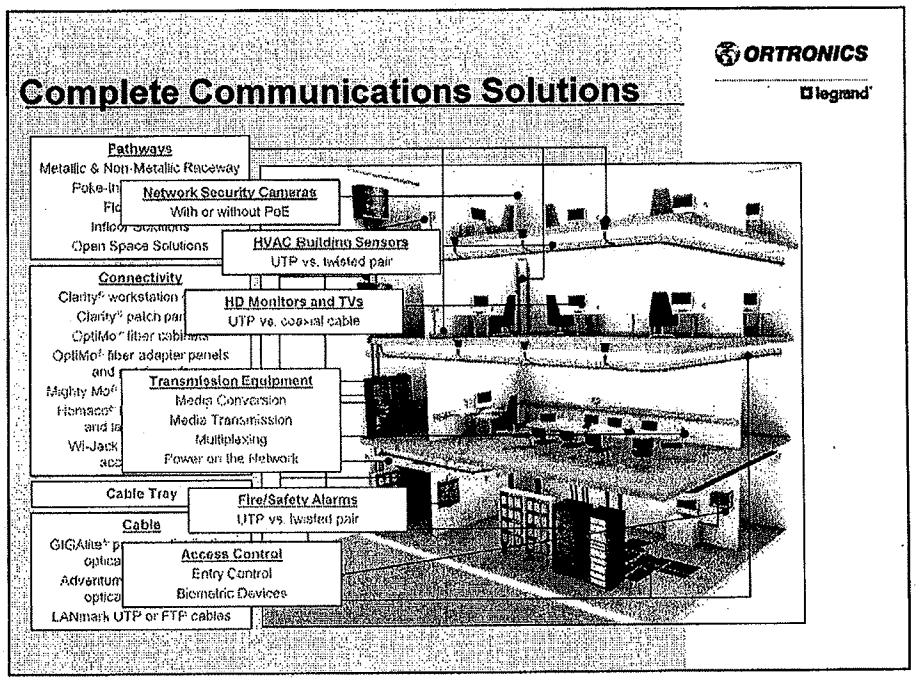
Network Infrastructure	Lifecycle
Servers and storage equipment	2 – 5 years
Switches and routers	5 – 7 years
Information transport systems	10+ year

Networking capability between individuals, departments, different organizations and globally is now an expectation. One of the major contributing factors that enabled this global networking is the OSI Networking model.

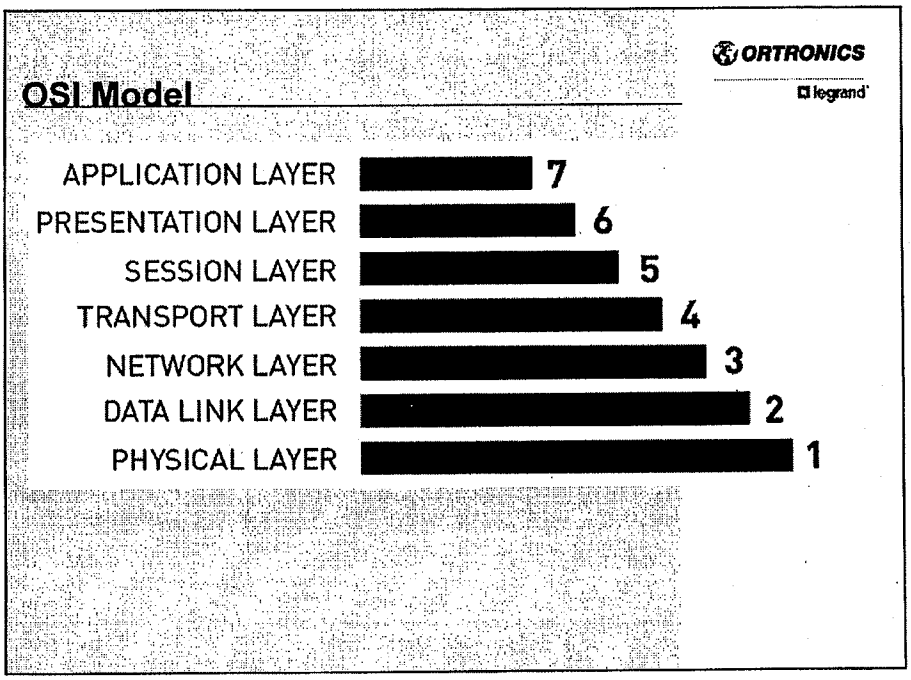
According to CISCO - Over the past decade, servers and storage arrays have typically been refreshed every 2 to 5 years and large switches and routers every 5 to 7 years. Data center facilities are often designed with a 10- to 20-year lifecycle.

This mismatch between facilities and IT has become a problem.

Our goal during this seminar is to introduce additional ways that the increasing network application demands can be supported by the Information Transport Systems being designed and already in place.



As is the case with creating most structures of any complexity, a solid foundation is critical for optimizing network performance. There is a rapid expansion of applications that must be supported as part of a premises Information Transport System. TIA, ISO/IEC and BICSI ITS guidelines provide valuable information for building a foundation in support of the many converging technologies. Networking protocol has been well defined. It's time to take a closer look at the infrastructure that's designed to last for 8 years or more and support the expanding technology demands



The OSI program grew out of a need for international networking standards and is designed to *(consistently)* facilitate communication between hardware and software systems despite differences in underlying architectures.

The OSI 7 layers model has clear characteristics. Layers 7 through 4 deal with end to end communications between data source and destinations. Layers 3 to 1 deal with communications between network devices.

On the other hand, the seven layers of the OSI model can be divided into two groups: upper layers (layers 7, 6 & 5) and lower layers (layers 4, 3, 2, 1). The upper layers of the OSI model deal with application issues and generally are implemented only in software. The highest layer, the application layer, is closest to the end user. The lower layers of the OSI model handle data transport issues. The physical layer and the data link layer are implemented in hardware and software. The lowest layer, the physical layer, is closest to the physical network medium (the wires, for example) and is responsible for placing data on the medium. Easy to use tool with comprehensive features at a fraction of the cost of others.

The specific description for each layer is as follows:

Layer 7: Application Layer
Defines interface to user processes for communication and data transfer in network
Provides standardized services such as virtual terminal, file and job transfer and operations

Layer 6: Presentation Layer
Masks the differences of data formats between dissimilar systems
Specifies architecture-independent data transfer format
Encodes and decodes data; Encrypts and decrypts data; Compresses and decompresses data

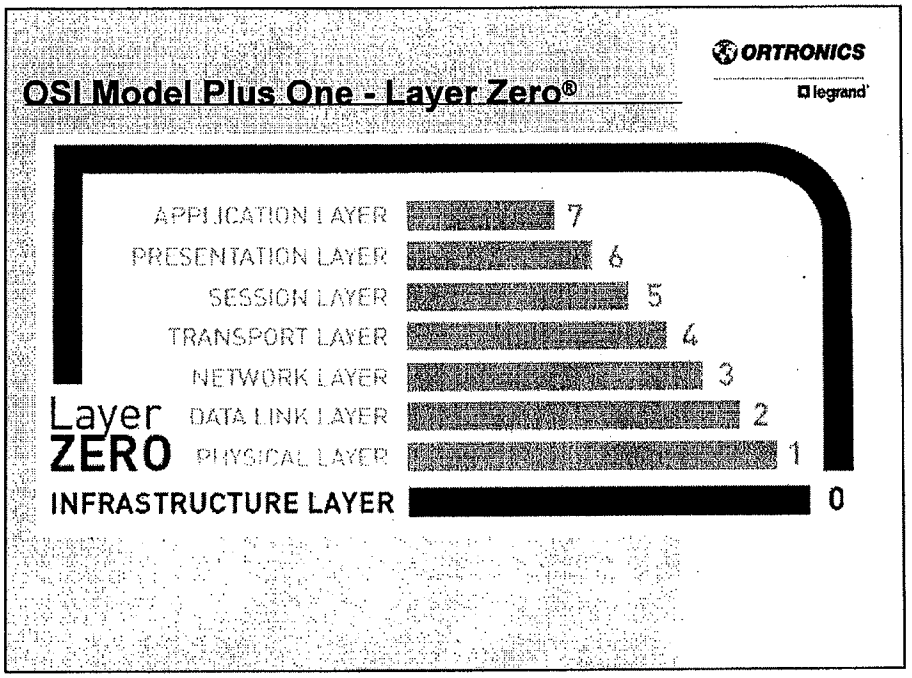
Layer 5: Session Layer
Manages user sessions and dialogues
Controls establishment and termination of logic links between users
Reports upper layer errors

Layer 4: Transport Layer
Manages end-to-end message delivery in network
Provides reliable and sequential packet delivery through error recovery and flow control mechanisms
Provides connectionless oriented packet delivery

Layer 3: Network Layer
Determines how data are transferred between network devices
Routes packets according to unique network device addresses
Provides flow and congestion control to prevent network resource depletion

Layer 2: Data Link Layer
Defines procedures for operating the communication links
Frames packets
Detects and corrects packets transmit errors

Layer 1: Physical Layer
Defines physical means of sending data over network devices
Interfaces between network medium and devices
Defines optical, electrical and mechanical characteristics



Layer 1 *the most basic – Physical Layer The physical layer is defined as the cable or physical medium itself, e.g., thinnet, thicknet, unshielded twisted pairs.*

However, Layer 1 not include Pathways or Physical Support - racks, cabinets and cable management. Support considerations for the physical layer is key to assuring maximum, consistent network performance.

Reminder to speaker – slightly different definition of OSI model.

The OSI (Open System Interconnection) model is an ISO standard for worldwide communications that defines a framework for implementing protocols in seven layers. Control is passed from one layer to the next, starting at the application layer in one station, proceeding to the bottom layer, over the channel to the next station and back up the hierarchy. Most of this functionality exists in all communications networks. Non-OSI systems often incorporate two or three layers into one. Vendors have agreed to support OSI in one form or another however OSI serves more as a model than a universal standard.

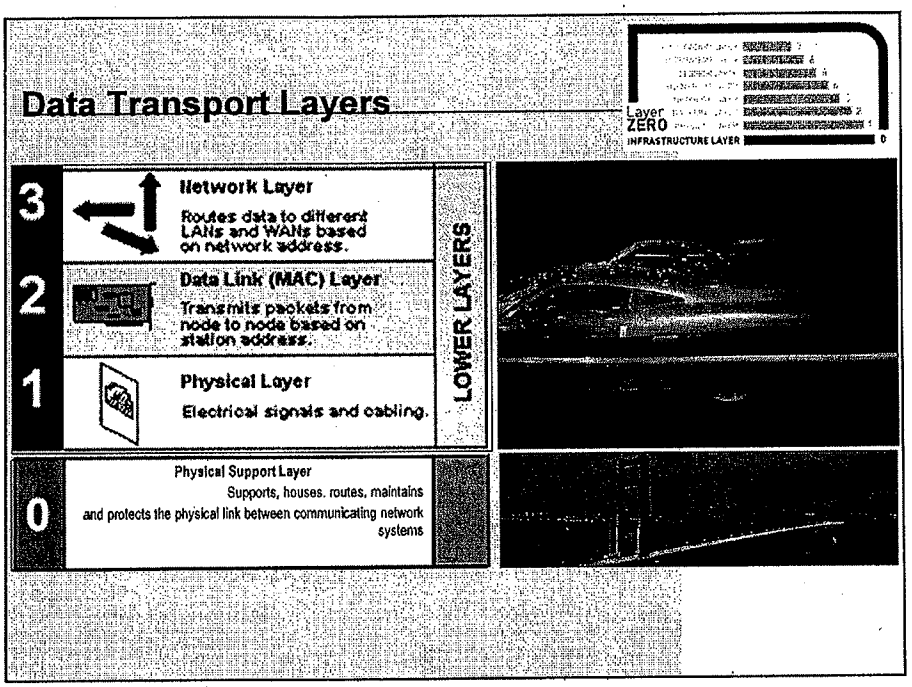
Layer Zero®

ORTRONICS

legrand®

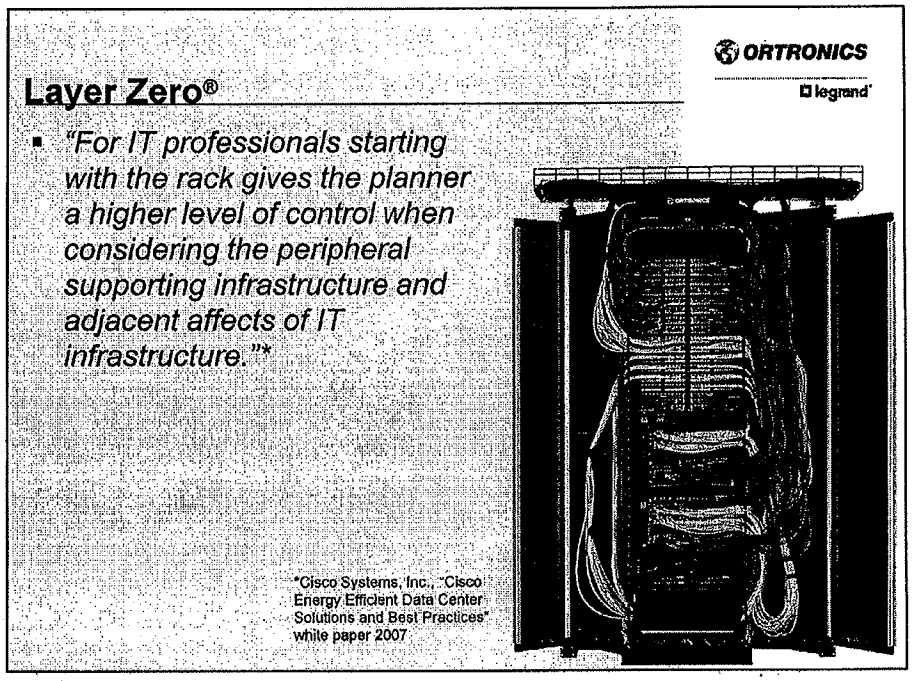
- "Once network data has been transferred to the Physical Layer, a solid foundation should be in place to assure optimum network performance
- There are standards in place to define product, its performance, and how an information transport system should be configured"*
- **The role of Layer Zero® is to support the Information Transport System and maximize network performance**

*Cisco Systems, Inc., "Cisco Energy Efficient Data Center Solutions and Best Practices" white paper 2007



The physical support layer defines the mechanical and functional specifications for supporting, housing, routing, maintaining and protecting the physical link between communicating network systems. Physical support layer specifications define characteristics such as proper mounting and support of network equipment, minimum bend radius for cables and patch cords, airflow control for network equipment, and cable fill capacities for cable management and pathway systems. Physical support layer implementations can be categorized as either layout or construction (seismic) specifications.

Poor cable management will contribute to poor signal transmission just as a poorly designed cable would, contributing to retransmissions and other network problems.

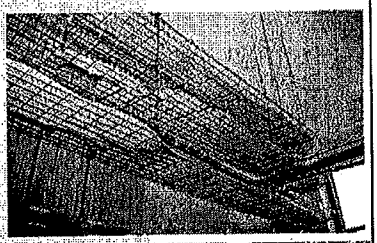


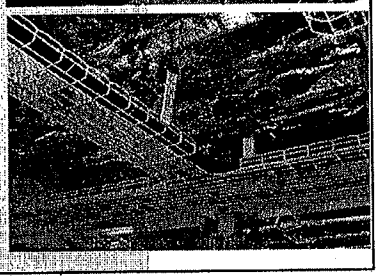
Once network data has been transferred to the Physical Support Layer a solid foundation should be in place to assure optimum network performance. There are standards in place to define product, its performance, and how an information transport system should be configured.

This Cisco advice was published in a white paper dedicated to Data Center efficiency. Data center applications continue to take center stage because of their rapid expansion and the associated energy and cable management challenges. These same problems exist outside the data center and must be addressed if we want to minimize future application performance deterioration.

Layer Zero® Environment

- Spaces - Data Centers or Telecommunications Rooms
  - Cable Management
  - Efficient Equipment Cooling
- Pathways - Vertical and Horizontal
  - Enhanced Performance
  - Fire Protection





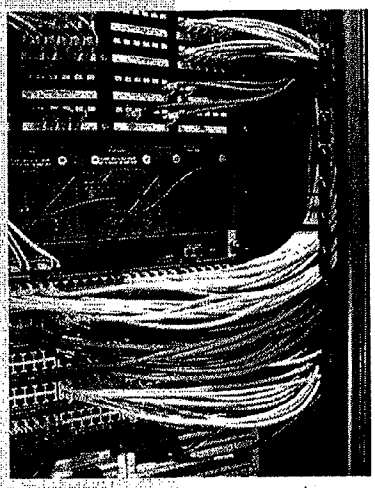
There is a trade-off in this great increase in performance of UTP cable created by the careful construction. This physical layer performance is dependent on the carefully created balanced line and cable geometry. Disturbance of this careful construction will degrade cable performance. As a result, installation practices and pathway support have become more and more important to the final performance of the cabling system.

Layer Zero® Environment - Spaces

ORTRONICS

legrand

- Cable Management Solutions
  - Vertical managers protect network performance by eliminating patch cord distortion where the cable exits the plug
  - More importantly, vertical managers protect the switch ports from damage
- Equipment Installation
  - Proper sizing of racks and cabinets is necessary to ensure proper support for network equipment



Cords should exit equipment or panel ports with minimum bend before being routed through vertical or horizontal cable managers

These vertical cable managers are designed so the fingers begin 2" out from the face of the switch so that even the end plugs are protected from distortion.

Layer Zero® Environment - Spaces

- Efficient Equipment Operations
  - Cooling
    - Physical Support Systems should be designed to meet all front, side and rear clearance requirements for proper cooling
    - Side vented switches should NOT be mounted in a 24" wide server cabinet
    - Utilizing rack and cabinet systems that have honey-comb sides and baffles will ensure that air intakes are properly set allowing for cold (not hot) air to enter the network equipment.
  - Cold Aisle-Hot Aisle Separation
    - Physical Support Systems also allow for more delineated hot aisle/cold aisle separation

ORTRONICS

legrand®

Cords should exit equipment or panel ports with minimum bend before being routed through vertical or horizontal cable managers

These vertical cable managers are designed so the fingers begin 2" out from the face of the switch so that even the end plugs are protected from distortion.

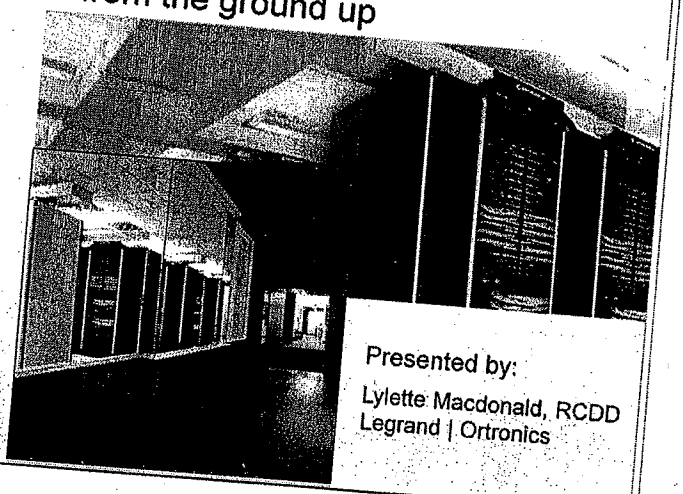
EXHIBIT X

Cancellation Proceeding No. 92054573
LayerZero Power Systems, Inc. v. Ortronics, Inc.

Exhibit Offered by Ortronics, Inc.

Layer Zero™

Revolutionize your network from the ground up



Presented by:

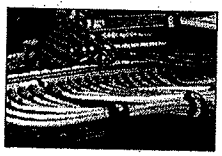
Lylette Macdonald, RCDD
Legrand | Ortronics

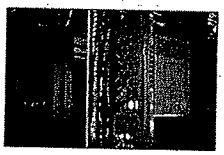
legrand®
Ortronics

Legrand | Ortronics
Global Leader Infrastructure Solutions

legrand®
Ortronics

- 40+ years experience
- Global support
- Subsidiary of global infrastructure company
- Extensive solutions offering
  - Connectivity
    - Copper
    - Fiber
  - Physical Infrastructure
    - Racks and cable management
    - Cabinets





Legrand | Ortronics is a world leader in high performance network infrastructure solutions, offering a complete range of Category 5e, 6 and 10 Gig copper, fiber optic, and residential/MDU connectivity solutions.

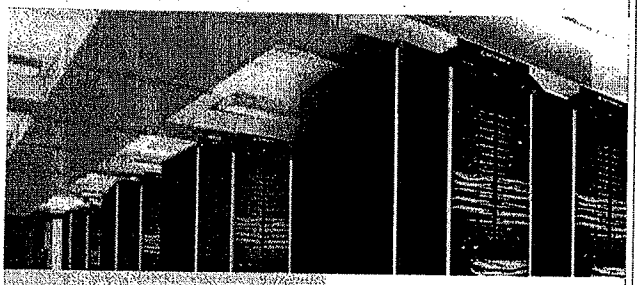
Legrand | Ortronics is part of **Legrand, the global specialist** in products and systems for electrical installations and information networks where people live and work.

Our philosophy is to begin with the network and design around it to support it properly.

Our innovations come from in house and as a direct result of looking beyond the standards' minimums. For example: we reinvented the standard EIA rack, creating a patented, deeper channel design that better spoke to the industry needs. We are the only company that has designed bend limiting clips that attach to the cable management fingers and channel bend limiters to address macrobends to fiber and copper cable.

We start with the standards and minimums and take them one step further to protect the network instead of simply complying.

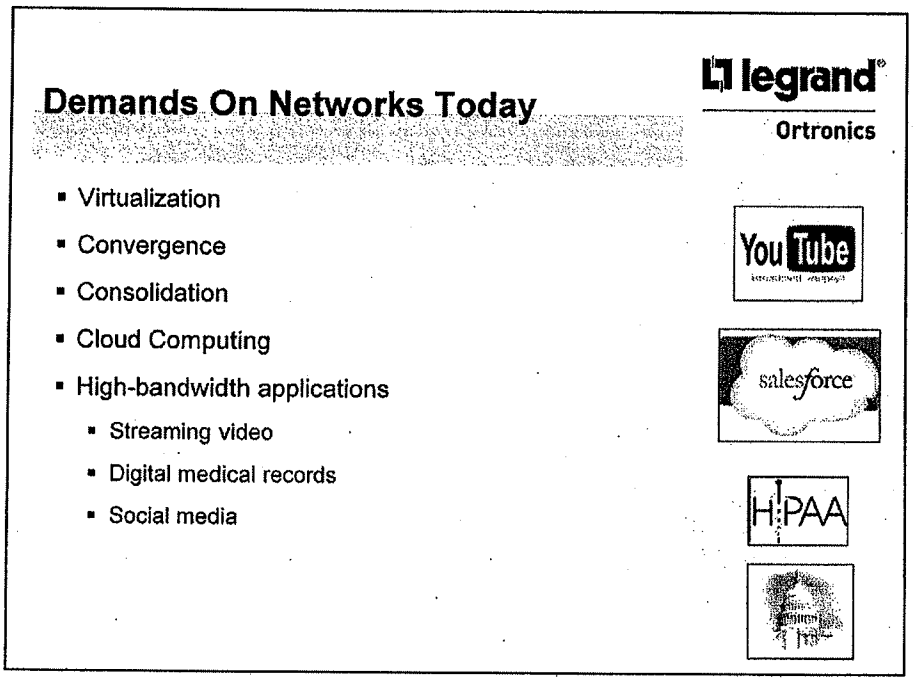
Key Business Concerns



legrand®

Ortronics

Layer ZERO™



Demands on networks today:

The amount of data networks are expected to handle is growing at exponential rates. Advances in technology are placing an even **greater burden on network** hardware, operating systems, resources, software, servers, bandwidth and cables.

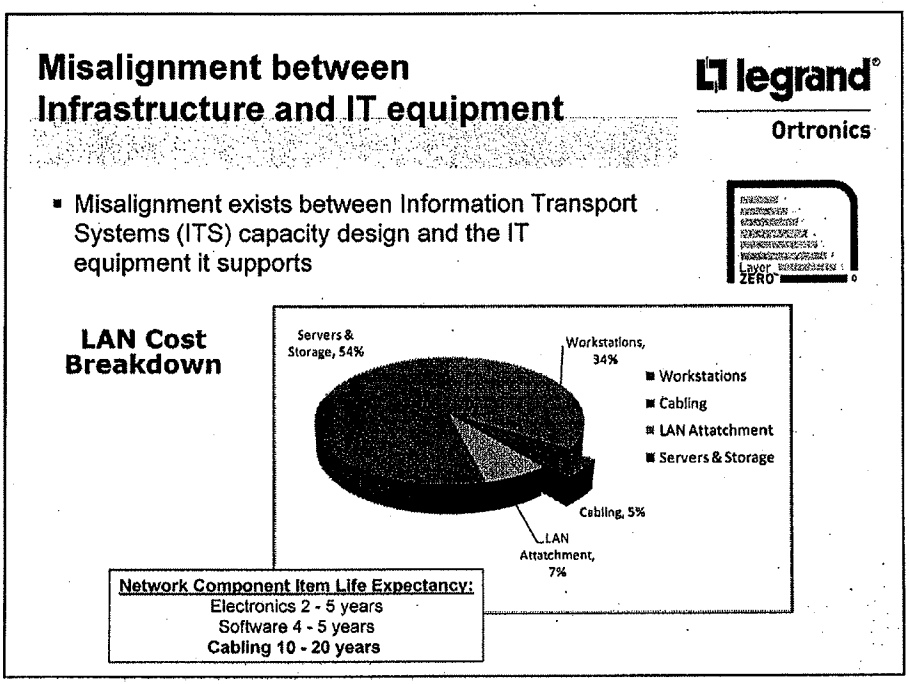
Virtualization, convergence and consolidation are increasing loads, densities and temperatures. Systems are being called on to **support more media rich, higher bandwidth applications** such as Facebook, Hulu, Netflix and ecommerce. Networks must have greater security, storage capacity and more in depth processing to support the demands of applications such as POS and medical imaging and to comply with government regulations.

These increased densities **generate a correspondingly greater amount of heat**, driving up electrical costs by challenging conventional cooling systems and threatening the overall life of your equipment.

Information Technology and Infrastructure Challenges

legrand®
Ortronics

- Today's digital networking users continue to ask for better processing performance, improved access and lower latency
- At the same time, cost pressures increase from shrinking IT budgets
- Smooth migration to new technologies is expected with minimum disruption or down time



According to CISCO, over the past 10 years, servers and storage arrays have typically been refreshed every 2 to 5 years.

Large switches and routers have typically been refreshed every 5 to 7 years.

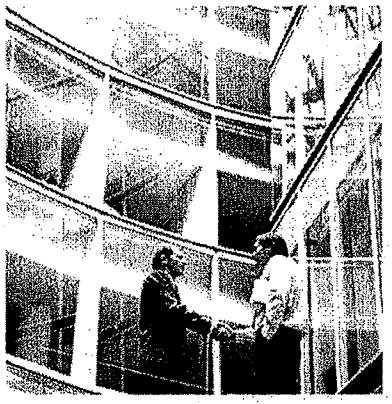
Data center facilities, however, are often designed with a 10 to 20 year lifecycle.

This mismatch between facilities, IT planning and expectations is an ongoing challenge and can be a good opportunity to install future looking infrastructure and connectivity solutions.

IT Managers and Facility Managers Changing Roles

legrand®
Ortronics

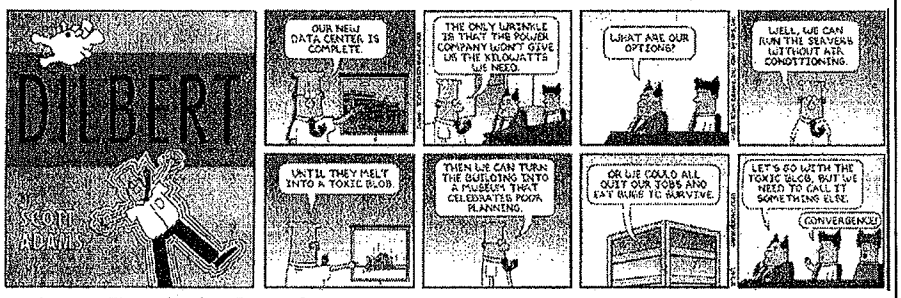
- IT managers responsibilities expanding
  - IP based VoIP, security and building automation in enterprise environments
  - Data center application convergence and power usage management
- Facility managers tasked with using existing Information Transport Systems (ITS) to support these expanding application demands



Increasing burden on network performance

Data Center Revelation

legrand®
Ortronics

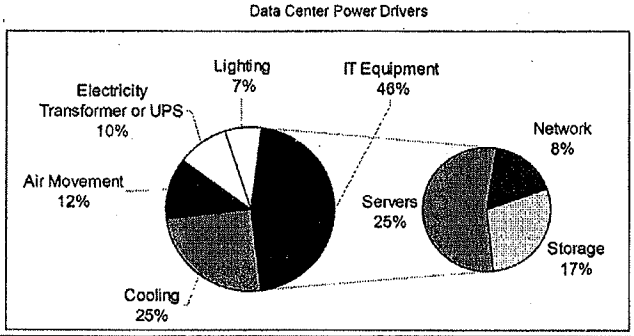


- Layer Zero in the Data Center

Survey of Data Center Managers' Top Issues

legrand® Ortronics

- Power Consumption is #1
- Cooling efficiency
- Moves Adds and Changes
- Convergence of SANs and IP Networks
- Security
- Business Continuity Planning



We have found that the top 6 issues facing data center managers today are as following. They are ranked in order of importance.

Power Consumption – On average, the power bill is over 50% of a data center operating budget. That OPEX budget includes the human costs. Electricity costs more than staffing.

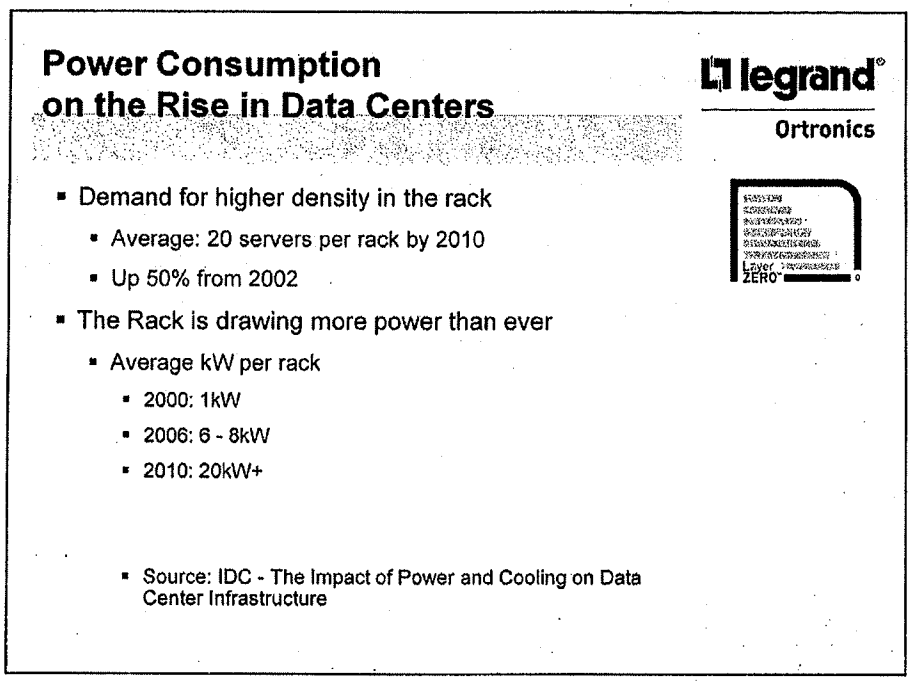
Cooling Efficiency – 45 cents of every power dollar is for some aspect of the cooling system, be it CRAC units, air handlers or the like.

MACs – Keeping track of MACs is even more critical in environments where equipment is constantly being moved around. Colo's have tenants moving constantly. Centers that employ virtualization also need to know where equipment is at all times.

Convergence – The melding of different technologies has always posed issues and has emerged as the next step for future growth in data centers today.

Security – Physical and logical security are critical to maintaining control at any data center. Not only do managers need to know when a location has been accessed, but also what was accessed.

Business Continuity Planning – Having a true, exercisable disaster recovery plan is a challenge for customers today given the tight budget constraints, reduced staffing levels, and complexity of converging technologies. Data center managers are struggling to develop appropriate solutions to this issue.



By combining blade servers, virtualization technologies, and new power and cooling equipment, data center managers are attempting to consolidate their infrastructure and reduce their data center footprint to fewer equipment racks. This increases the density per equipment rack.

Power in the data center is used for a whole host of things: lighting, CRAC units, generators, auxiliary power, UPSs, chillers, PDUs, and most importantly IT equipment. With requirements for storage continuing to grow, along with the density of the equipment packed into each rack, it's now common for a typical rack to require 5 to 7 kilowatts (versus 1 to 3 in the past), with high-density blade server implementations requiring upwards of 24 to 30 kilowatts per rack.

Taking into account these increases with the rising price of electricity and legislation requiring data centers to lower their energy consumption of pay for overages, it is clear why this issue is becoming increasingly critical.

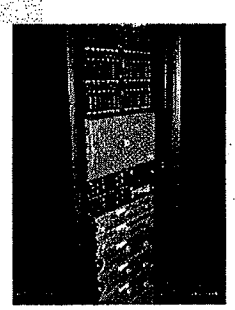
Virtualization & consolidation are driving up heat loads at the rack level.

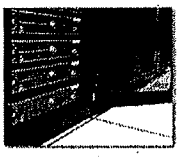
Energy costs per year for just two racks of servers can exceed $105,000.

Power Consumption Issues

legrand®
Ortronics

- Power Consumption Drivers
  - Increased demands on cooling are driving power consumption and utility costs
  - Energy costs represent 55% of the monthly operating expenses of a data center, with cooling accounting for 33% of the energy costs
  - Need for redundant power for disaster recovery
  - Deployment of new active equipment and/or technology using the existing power infrastructure





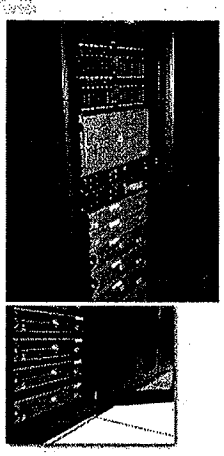
Power in the data center is used for a whole host of things; lighting, CRAC units, generators, auxiliary power, UPS', chillers, PDUs, and most importantly IT equipment.

With requirements for storage continuing to grow, along with the density of the equipment packed into each rack, it's now common for a typical rack to require 5 to 7 kilowatts (versus 1 to 3 in the past), with high-density blade server implementations requiring upwards of 24 to 30 kilowatts per rack. Taking into account these increases with the rising price of electricity and legislation requiring data centers to lower their energy consumption of pay for overages, it is clear why this issue is becoming increasingly critical.

Power Consumption Issues

legrand® Ortronics

- Power Consumption Drivers
  - AC vs DC
    - Most current data centers are designed for AC (alternate current) power sources
    - All telephone company central offices are designed for DC (direct current) power sources
    - Due to cost and safety concerns, some data centers are migrating to DC power



Continuing with our discussion about power consumption issues:

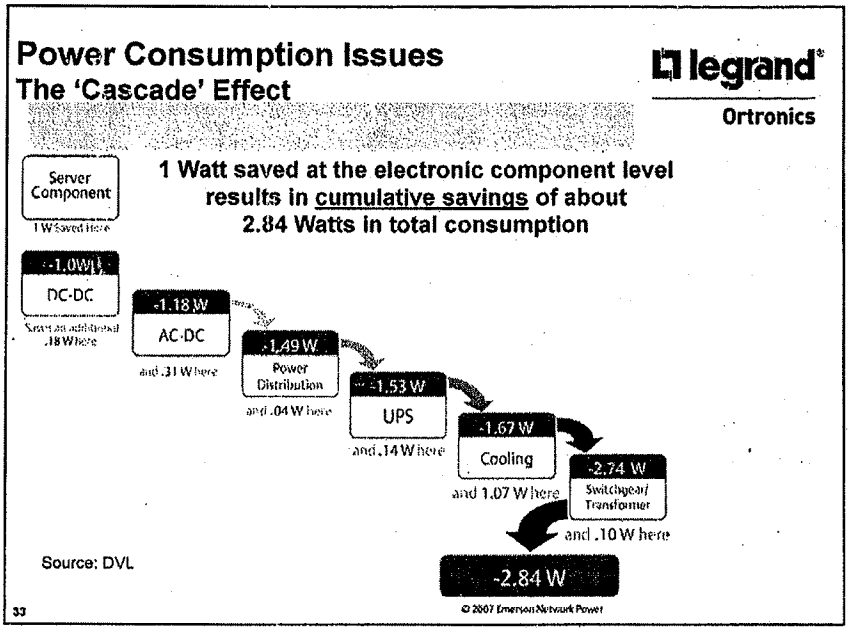
AC vs. DC power

Thomas Edison originally promoted DC for electrical power distribution, considering it a safer, more reliable option than AC power. Edison faced off against Nikola Tesla and George Westinghouse in the ensuing "Current Wars." AC ultimately came out on top due to technological limitations of the time. AC had the advantage back then of being stepped up to high voltages by using transformers, sent via thin, inexpensive wires, and eventually stepped down again at distribution to the user site. Still, DC power has continued to be used in high voltage scenarios, as well as in low voltage deployments in the telecommunications industry and light transportation industry.

AC vs. DC power for Data Centers

In a typical data center, the redundant power distribution system provides 480-volt AC power through an uninterruptible power supply (UPS) and then to a transformer, which then steps it down to 208-volt AC at a power distribution unit (PDU) to feed racks of servers. Within the UPS system, the 480 volt AC is converted to DC and charges batteries and then is converted back to 48 volt DC. Individual power supplies (typically redundant) within each server convert the 120/208-volt single phase AC into a voltage appropriate for the unit's needs. These individual supplies are often inefficient, generating substantial heat that the room's air conditioning system must remove at great expense. This heat can also limit the number of servers that can be housed in a data center and can jeopardize data center reliability if not handled properly.

In total, there can be up to six or more power conversion stages between facility power entry and the microprocessor or other data processing circuits. The power losses due to the use of inefficient power conversion devices from both outside and within equipment result in a large loss of useful electrical power, as well as directly increasing the energy required to remove the heat produced. Thus, for every watt of power utilized to process data, about 0.9W is required to support power conversion. In addition, about 0.6 to 1 watt will be required to cool the power conversion equipment. By skipping conversion steps, a DC-powered datacenter saves overall electricity use through eliminating extra power conversions and reducing datacenter cooling needs, increases equipment densities, and helps reduce heat-related failures.



Key Points:

•Emerson Network Power recently created a roadmap to reducing energy usage in the data center to save on energy costs as well as free up power and cooling capacity and space.

•Energy Logic is based on the cascade effect, by which 1 Watt saved at the server component level results in cumulative savings of about 2.84 Watts in total consumption.

•If you reduce the power consumption of your servers, for example, you have less to cool, and so on.

Measuring Power Use and Changes

legrand® Ortronics

- PUE (power usage efficiency or effectiveness) and DCiE (data center infrastructure efficiency)
  - PUE / DCiE are efficiency benchmarks comparing your data center's infrastructure to your existing IT load.
- Developed by The Green Grid
- DCeP (data center energy productivity)
  - Calculating DCeP allows users to right-size virtual and physical infrastructures to support business needs.
  - DCeP = Useful Work Produced / Total Data Center Energy Consumed over time

PUE = Total Facility Power / IT Equipment Power

DCiE = IT Equipment Power / Total Facility Power

PUE	DCiE	Level of Efficiency
3	33%	Very Inefficient
2.5	40%	Inefficient
2	50%	Average
1.5	67%	Efficient
1.2	83%	Very Efficient

Source: Green Grid

Power usage effectiveness (**PUE**), is the ratio of total amount of power used by the data center facility to the power delivered to IT equipment. PUE was developed by a consortium called The Green Grid. PUE is the inverse of Data Center Infrastructure Efficiency (DCiE).

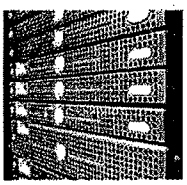
Data center infrastructure efficiency (**DCIE**), is a performance improvement metric used to calculate the energy efficiency of a data center. DCIE is the percentage value derived, by dividing information technology equipment power by total facility power.

Bottom Line: The higher the DCiE and the lower the PUE – the MORE EFFICIENT YOUR DATA CENTER IS!

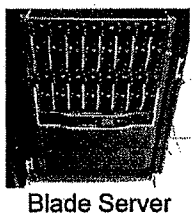
Cooling Efficiency Issues

legrand®
Ortronics

- Housing Blade Servers
  - Servers on a card, containing processors, memory, integrated network controllers, an optional Fibre Channel host bus adaptor (HBA) and other input/output (IO) ports
  - Virtualization & consolidation are driving up heat loads at the rack level
  - Energy costs per year for just two racks of servers can exceed $105,000*



Rack Server



Blade Server

* Gartner, "Infrastructure and Operations: Charting a course for the coming decade

New Power and Cooling Considerations

legrand® Ortronics

- Cost of power and cooling
  - Large power cost increases
  - New high-density servers' cooling requirements
  - Power costs moving to IT budget
- Availability of power
- Green IT concerns
  - Greenhouse gas emissions taxes
  - Renewable energy

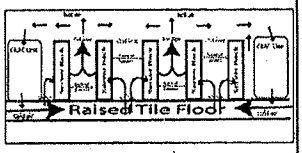
In the past, only facilities management had been concerned with power and cooling infrastructure. DC managers focused on IT equipment rather than the infrastructure needs of the data center. As the cost of data center power increases, and availability of power begins to decrease, the IT manager has begun to take more responsibility for power costs. As a result of the greater awareness, energy costs are being moved from facilities budgets and being included in the IT budget.

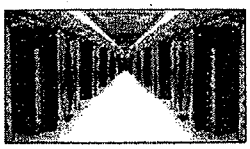
Another important consideration is the impact of Green IT concerns as more companies implement corporate social responsibility policies.

Data Center Cooling Applications

legrand®
Ortronics

- Hot Aisle/Cold Aisle Rack Configuration
  - Method of cooling equipment in which every aisle between rows of racks is bounded with exclusively hot-air outlet or exclusively cool-air intakes.
- Hot Aisle/Cold Aisle Containment
  - Maximize the hot aisle/cold aisle arrangement by encasing the cold aisle with barriers to ensure the cold air stays at the server intake
- Close-Coupled or In-Row Cooling
  - Targeted cooling and control of hotspots by moving the cooling source closer to the high heat areas in equipment racks
- Liquid Cooling
  - Chilled water directly to the rear door of racks





Hot Aisle/Cold Aisle Layout (most common in today's data centers) The fronts of the racks face each other and become cold aisles, due to the front-to-back heat dissipation of most IT equipment. Computer Room Air Conditioners (CRACs) or Computer Room Air Handlers (CRAHs), positioned around the perimeter of the room or at the end of hot-aisles, push cold air under the raised floor and through the cold aisle, Perforated raised floor tiles are placed only in the cold aisles concentrating cool air to the front of racks to get sufficient air to the server intake. (naturally all the servers should be mounted so that their intake is facing the front of the rack, and their exhaust is facing the rear). As the air moves through the servers, it's heated and eventually dissipated into the hot aisle. The exhaust air is then routed back to the air handlers.

Hot Aisle/Cold Aisle Containment: Cold Aisle Containment attempts to maximize the hot aisle/cold aisle arrangement by encasing the cold aisle with barriers made of metal, plastic or fiberglass. This approach eliminates the above challenges, ensuring the cold air stays at the server intake, while the air handlers receive the warmer exhaust error, improving their efficiency. In Hot Aisle Containment, the hot aisle is now enclosed, using the same barriers as its cold aisle counterpart. The design captures exhaust air via **In-Row** air conditioners, conditions it, and returns it to the cold aisle. AC efficiency is further improved as neither the hot exhaust air nor cold inlet air has far to travel.

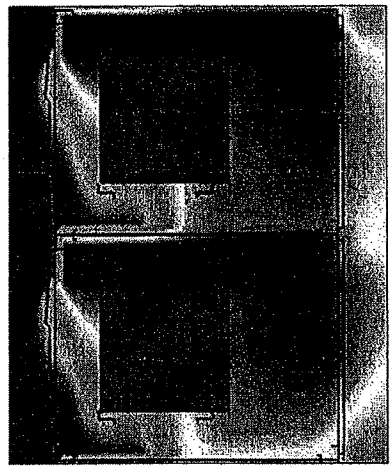
Close Coupled Cooling: (supposedly a new concept) Close-coupled cooling aims to bring heat transfer closest to its source: the equipment rack. Moving the air conditioner source closer to the equipment rack ensures a more precise delivery of inlet air and a more immediate capture of exhaust air.

It's Hot in Here!

legrand®
Ortronics

Heat Exhaust & Equipment Failure

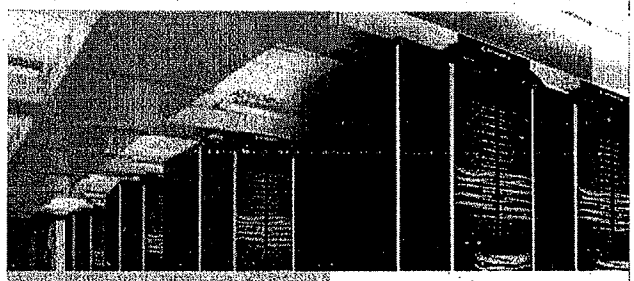
- Heat exhaust
  - Raises ambient temperature
  - Creates hot spots
  - Can cause equipment failure
  - Increases cooling costs
- Electrical cooling can add to the load



Hot Server Rooms & Data Centers

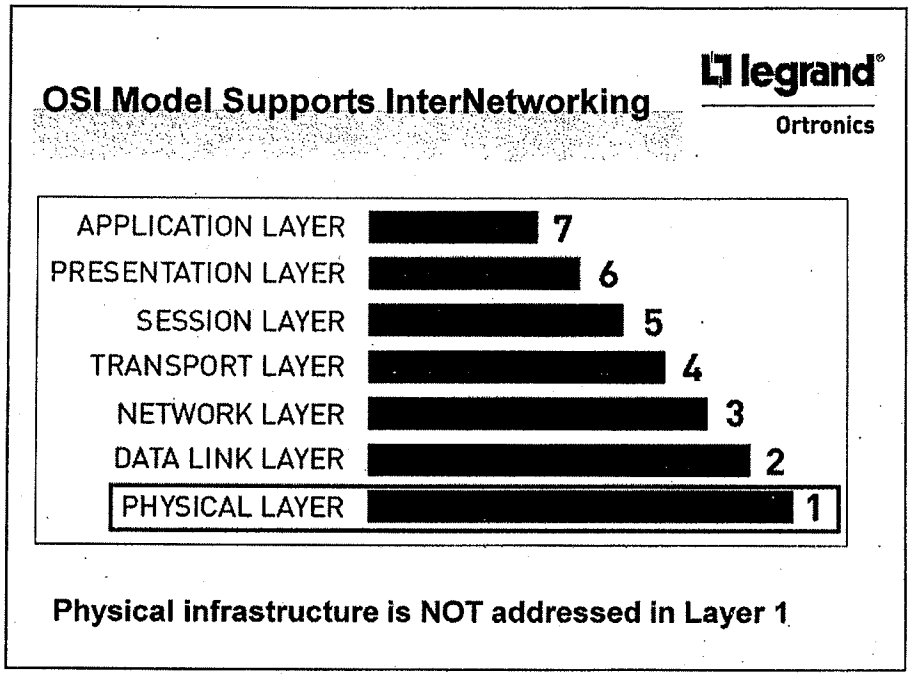
Heat exhaust from servers and switches, plus higher density demands, **raise the ambient room temperature** and **create hot spots**. If left unchecked, this additional heat **can lead to equipment failure**. An additional challenge is that electrical cooling solutions can **add to the heat** load, decreasing their effectiveness.

Definition of Layer Zero™



legrand®

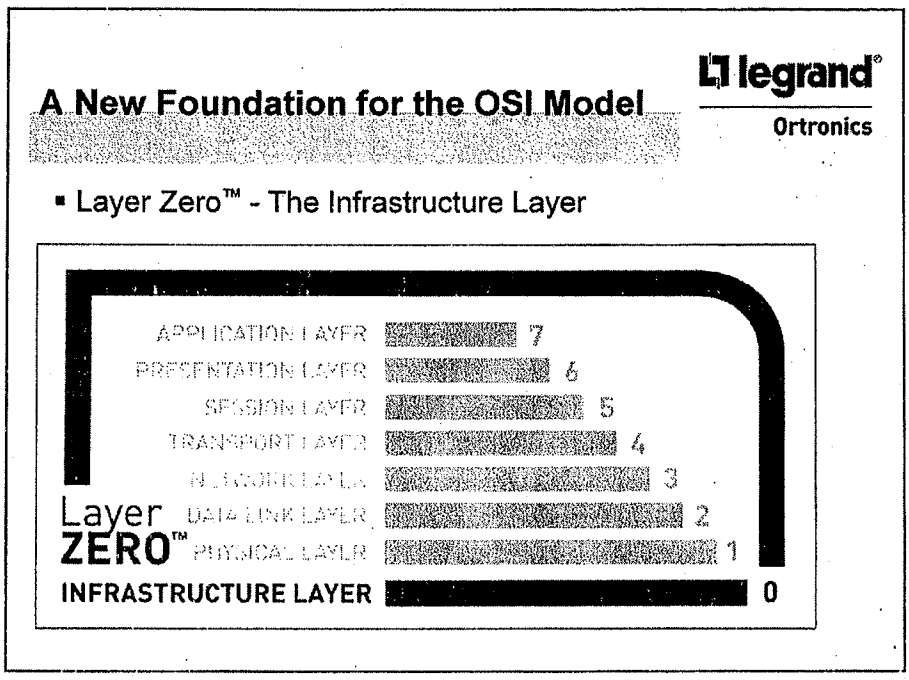
Ortronics



A New Look at the OSI Model

The ISO/OSI Network Model is a seven layer reference model that provides a standard for communication networks. The layers interact by providing services to the layer above and receiving services from the layer below. The foundation of the current OSI model is Layer One, the Physical Layer, and refers to the basic hardware transmission technologies of a network, or structured cabling.

Layer 1 **does not make mention of the physical support**, or infrastructure, that supports this cabling.



Layer Zero

Layer Zero is the new proposed foundation layer for the OSI model introduced by Legrand | Ortronics. Layer Zero - the Infrastructure Layer - addresses the **critical role that physical infrastructure plays** in network performance. A new level of stability is introduced to the network by recognizing the importance of the underlying layer and emphasizing best practices in pathway and physical support design.

Layer Zero encompasses the entire physical structure that supports your network: not only racks and cabinets, with advanced cable management, but pathway solutions, underfloor and overhead systems and as well.

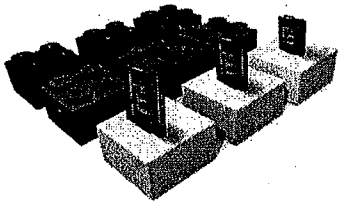
Layer Zero solutions incorporate Ortronics racks, cabinets, and cable management with Wiremold pathways and Cablofil cable tray for a fully integrated physical infrastructure solution that is 'Designed to be Better'.

It's the Why!

legrand®
Ortronics

With the right planning, the defining elements of capacity, density, efficiency and scalability can be aligned through the infrastructure.

One basic best practice: adopt the rack as the basic building block for data center density.



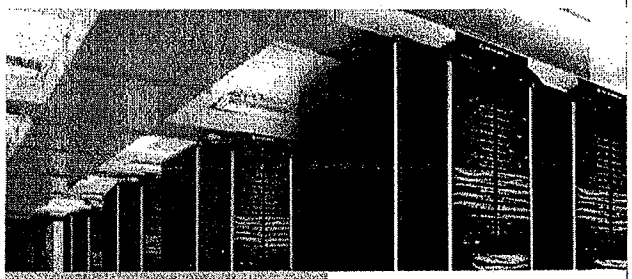
-- Energy Efficient Data Center Solutions and Best Practices, CISCO

Changing the way you look at your network

Cisco has also identified the **underlying infrastructure as critical to the success** of a network.

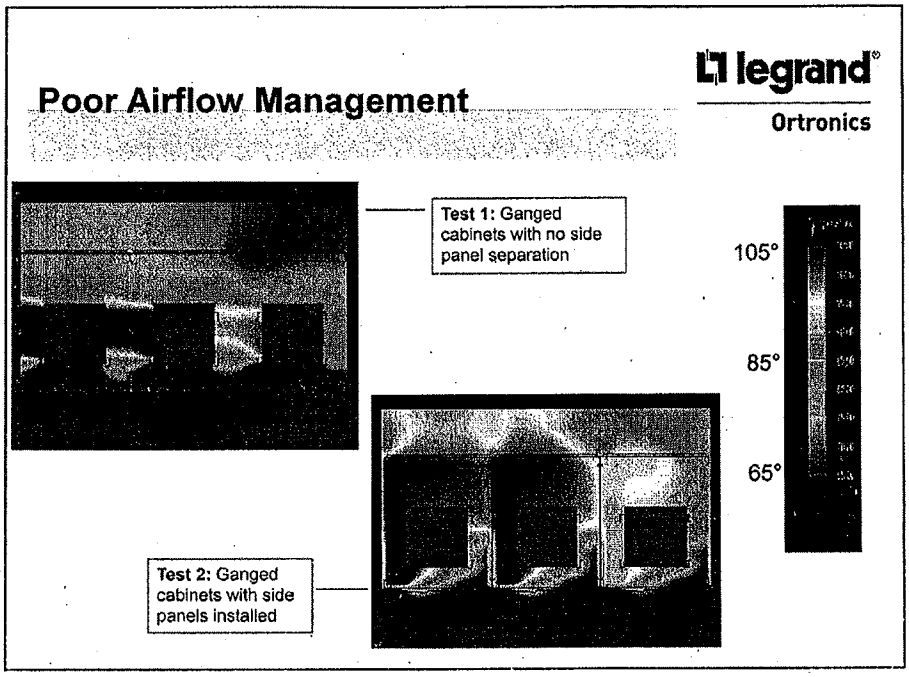
Their white paper, Energy Efficient Data Center Solutions and Best Practices, specifies that "With the right planning, the defining elements of capacity, density, efficiency and scalability can be aligned through the infrastructure. One **basic best practice: adopt the rack** as the basic building block for data center density. "

Impact of Layer Zero™



legrand®

Ortronics



Your Network is only as good as its weakest link

Here is a visual example of what increased demands on your network can look like in your data center: this is from a computational fluid dynamic analysis (CFD).

Test 1 - Typical cabinet with no dividers or side panels

When side venting equipment is mounted in typical cabinets without side panels or dividers, maintaining the recommended distance between the equipment does not provide adequate cooling in a hot aisle/cold aisle environment.

The problem with this approach is that it allows the exhaust of one switch to enter the intake of the next switch.

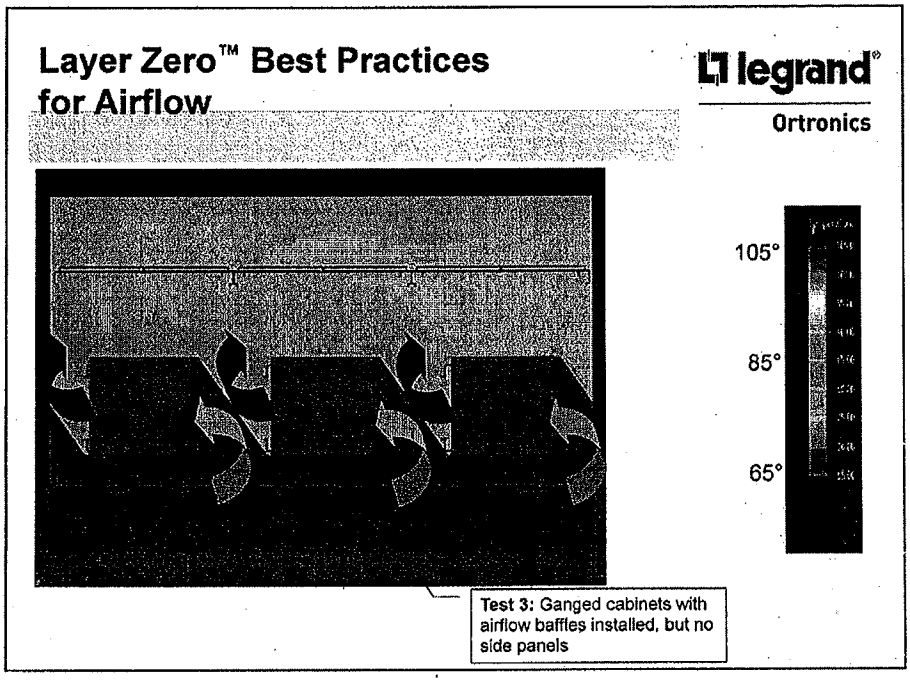
Each switch down the row is receiving less cooling, even though the cold aisle air temperature is set at an appropriate 65°F to 70°F.

Test 2 - Typical cabinet with cabinet dividers

Adding divider panels does very little to improve the cooling in a hot aisle/cold aisle environment.

This approach allows both the hot aisle and the cold aisle to provide air to the intake of the equipment.

As the hot air is exhausted it re-circulates back to the intake side of the equipment. Again each switch is receiving less cool air as you go down the row.

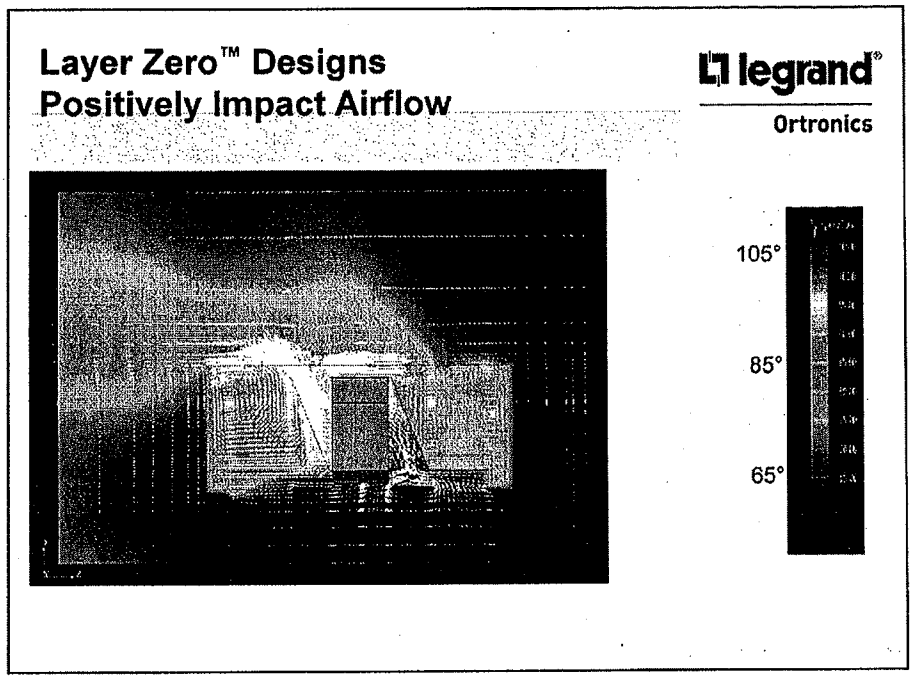


Test 3

Mighty Mo Cabinet with Mighty Mo Airflow Baffles

In a study performed by Legrand | Ortronics, the Mighty Mo system with airflow baffles reduced the exhaust temperature by 20°. The intake air only needed to be cooled to 65°F.

The alternative, doing nothing to emphasize the cold aisle and hot aisle separation, requires intake air to be cooled to 50°F to generate the same lower exhaust temperature. This reduction allowed the ambient temperature threshold to be raised by 15°F.



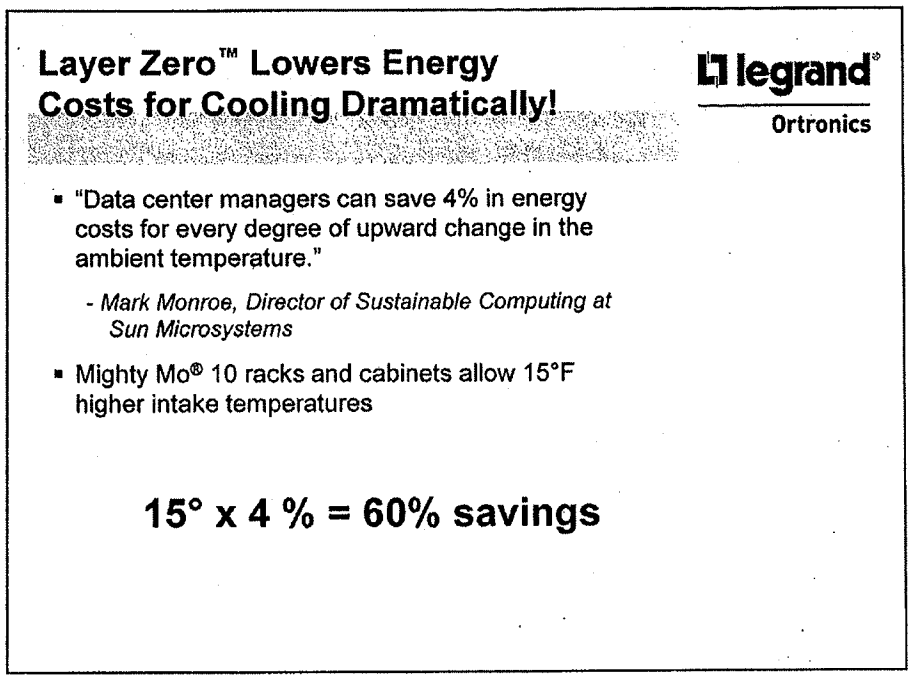
This is a second CFD analysis, showing a view from above of a gang of 3 cabinets with airflow baffles. The CFD analysis shows cooler temperatures in the hot and cold aisles.

How does Layer Zero impact the network?

Immediate improvements can be made to the network with the introduction of Mighty Mo cabinets and airflow baffles.

Mighty Mo Cabinet with Mighty Mo Airflow Baffles

When using the Mighty Mo system with airflow baffles, the **intake air is always supplied from the cold aisle and the exhaust is directed by the baffles to the hot aisle**. The use of filler panels on the rear rails, in addition to the full height airflow baffles, **eliminates the recirculation of hot air within the cabinets.**



Layer Zero adds to the bottom line

As mentioned in the previous slide, in a study performed by Legrand | Ortronics, the Mighty Mo airflow baffle solution reduced the exhaust temperature by 20°. The intake air only needed to be cooled to 65°F. Since the system without any hot aisle cold aisle separation needed intake air cooled to 50°F to generate the same lower exhaust temperature, the ambient temperature threshold was able to be raised by 15°F.

This created a **60% reduction in energy costs for cooling switches.**

65°F - 50°F = 15°F. 15°F X 4% = 60%

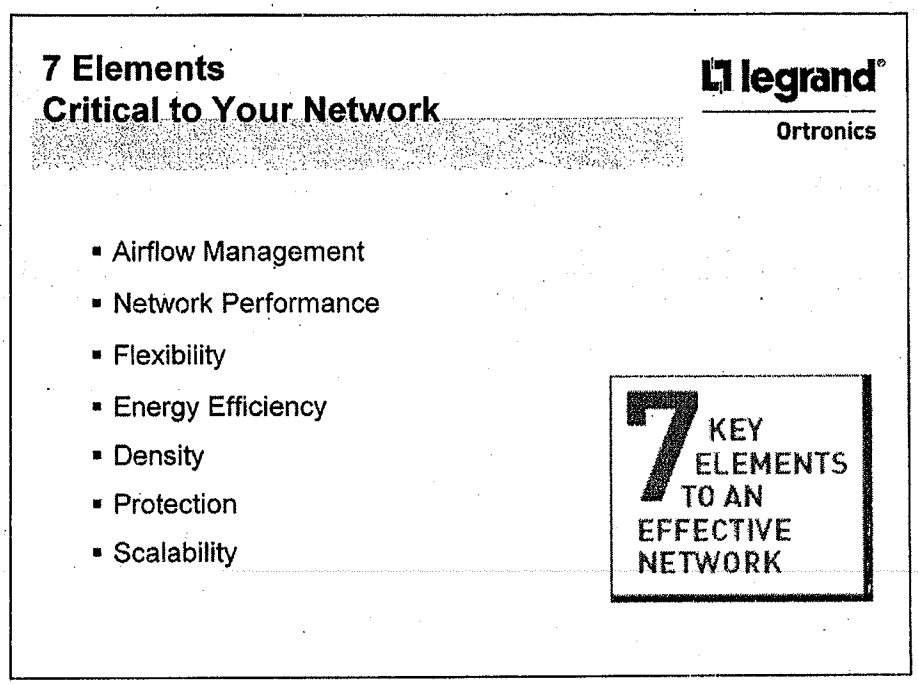
*The thermal studies referenced as the basis for this equation were compiled using a series of three network cabinets and a series of three Mighty Mo 10 racks within the center of a row of a data center; not a full data center. These analyses were conducted as separate tests. By installing the Mighty Mo airflow baffles system, the exhaust air temperature from both the series of cabinets and racks was reduced by 20°, decreasing from a temperature of 105° to 85°.

As a result of the ability to decrease the exhaust temperature, the intake air only needed to be cooled to 65° to maintain an acceptable ambient room temperature. The comparative systems, cabinets using neither side panels, nor divider panels, cabinets using only divider panels and a standard EIA rack configuration, needed an intake temperature of 50° to achieve the same cooler exhaust temperature. The difference in intake temperatures or set points is 15°.

At the 2007 AFCOM Data Center World Conference, Mark Monroe, the Director of Sustainable Computing at Sun Microsystems, stated that "*Data center managers can save 4% in energy costs for every degree of upward change in the set point.*"

Using the 4% savings, multiplied by the 15° change = 60. This is the 60% energy savings for cooling switches.

Please note that a data center manager would see variability depending on the size of the data center, the way racks and cabinets were loaded, etc. Also, please note that the statement references cooling costs only - as opposed to overall energy or electricity costs - and by specifying switches, it aligns with the data that we have gathered.



7 key elements to create an effective network

The following 7 elements have been identified by Legrand | Ortronics as critical to the effectiveness of your network: **Airflow Management, Density, Network Performance, Flexibility, Energy Efficiency, Scalability and Protection.**

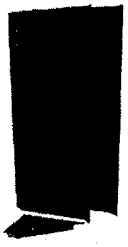
Without the proper management and optimization of these elements networks **lose effectiveness, bandwidth, speed and quality.**

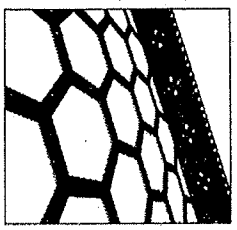
These elements can be managed through the Layer Zero infrastructure and can be used to maximize your network's potential and performance. They are covered in detail in the forthcoming slides.

Manage Airflow Across the Network

legrand® Ortronics

- Generate more efficient cooling
- Create proper airflow
- Enhance separation of hot aisle and cold aisle
- Eliminate hot air recirculation
- Improve thermal management with better ventilation
- Reduce power consumption





Mighty Mo® 10 racks with honeycomb side rails

Mighty Mo® airflow baffles

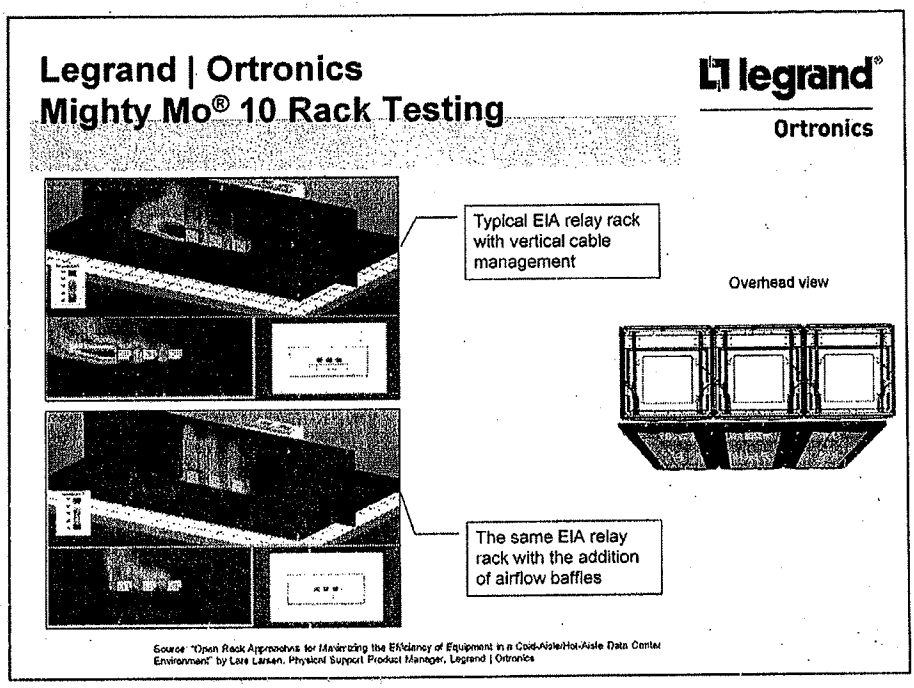
Cablofil® wire mesh cable trays

Layer Zero infrastructure solutions manage airflow and heat across the entire network using a passive cooling design. Enhancing the barrier between the hot and cold aisle with airflow baffles creates a proper airflow pattern and helps eliminate hot air recirculation within the cabinets. This improves thermal management; eliminating hot spots and allowing better equipment ventilation - ultimately protecting equipment from overheating. Cooling is more efficient and power consumption for cooling is reduced.

Honeycomb side rails allow for better equipment ventilation and air movement.

Airflow baffles create a passive barrier to isolate cold aisle and hot aisle air more effectively

Raceways and wire mesh cable trays promote air circulation.



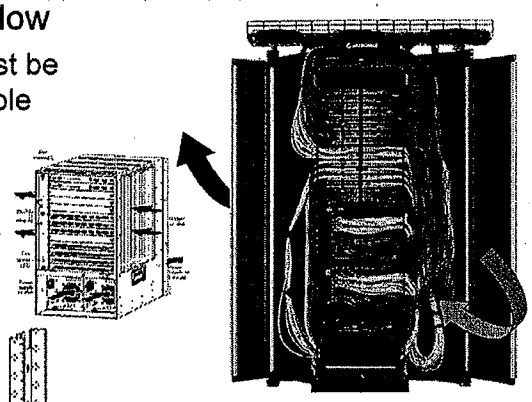
Very similar results to our cabinet testing occurred when we ran thermal modeling using the **Mighty Mo 10 racks**.
The intake air only needed to be cooled to 65°F, while the alternative system needed intake air cooled to 50°F to generate the same lower exhaust temperature. This reduction allowed the ambient temperature threshold to be raised by 15°F.
Again, the use of the baffles dramatically impacted the output temperature at the end of the row.

Data taken from 2008 Legrand | Ortronics white paper by Lars Larsen, *Open Rack Approaches for Maximizing the Efficiency of Equipment in a Cold Aisle / Hot Aisle Data Center Environment*

Layer Zero™ Passive Cooling

legrand®
Ortronics

- Side-to-side airflow
- Air at fan intake must be cooled and accessible
- Separation of cold aisle/hot aisle ambient air must be maintained

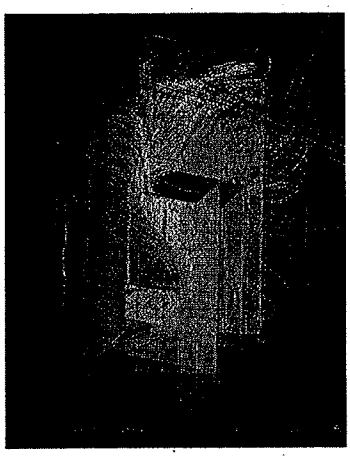


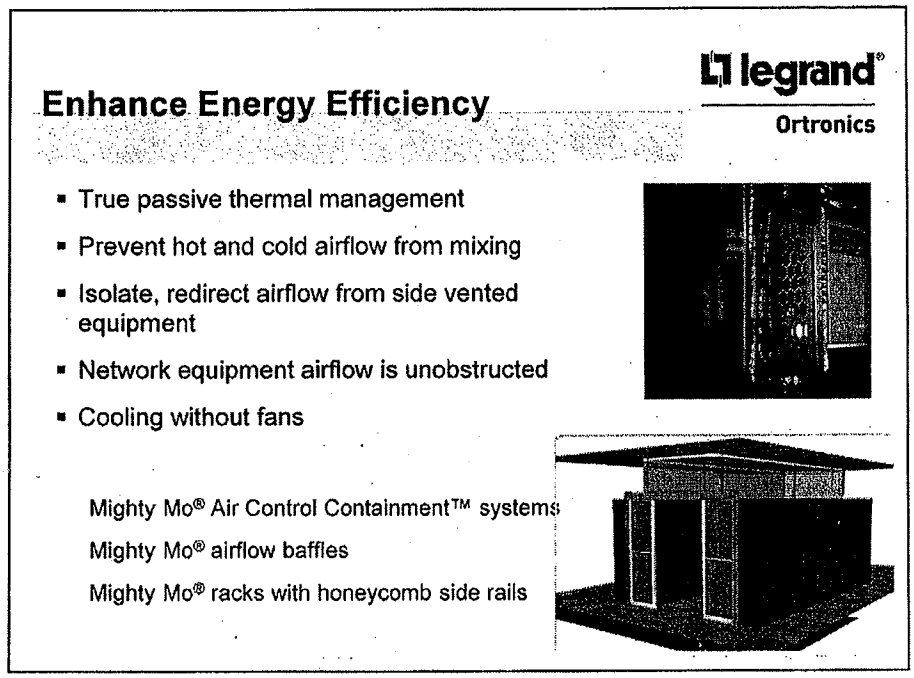
Cisco Catalyst 6513

Layer Zero™ Passive Cooling

legrand® Ortronics

- Nexus 7018
  - Air at fan intake must be cooled and accessible
  - Separation of cold aisle/hot aisle ambient air must be maintained





Energy Efficiency

True passive thermal management does not introduce any additional power sources for cooling:

Mighty Mo racks and cabinets use true passive cooling to lower equipment temperatures. They both have large air distribution capacity and ensure that network equipment airflow is unobstructed.

Airflow baffles and honeycomb sides isolate and direct intake and exhaust air without introducing the additional energy consumption of fans.

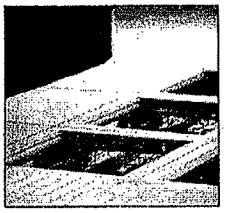
Mighty Mo Air Control containment systems augment the hot aisle / cold aisle separation with drop-ceiling mounted partitions or a flat, retractable roof system that attaches to the top of the racks.

A combination of the airflow baffles with the containment systems ensure that exhaust air from side vented equipment is isolated away from the cold aisle and directed into the hot aisle.

Maximize Flexibility

legrand®
Ortronics

- Support demands from Layer One
- Ensure MAC work has minimal impact
- Fully modular, configurable to specific installation
- Optimized for copper and fiber connectivity, heavy equipment

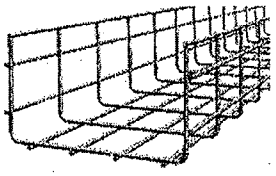


Mighty Mo® 10 server racks

Wiremold® raised floor zone enclosures

Cablofil® underfloor and overhead cable tray

Mighty Mo® waterfall extensions



Flexibility

Assure a flexible physical design that will support technology demands from the physical layer: **a well thought out Layer Zero infrastructure** enables MAC work to have a minimal impact throughout the network.

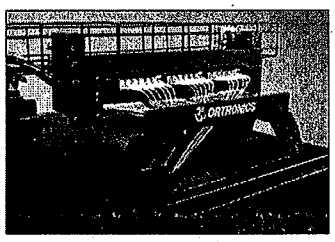
Our infrastructure solutions are optimized for copper and fiber connectivity and heavy equipment. Server **rack mounting rails adjust** from 12.5" to 30" to handle and route cables, all without impeding airflow. The mounting rails are independent of the structure and can be adjusted even after installation. **Cable management solutions are interchangeable** with both the Mighty Mo racks and cabinets. In addition, infrastructure solutions are **fully modular** and can be configured to suit your specific installation.

Anticipate Scalability

legrand®
Ortronics

- Support future network design changes
- Fast, seamless adaptations to changing requirements
- Integrate seamlessly with Layer One products
- Racks, cabinets built with higher weight thresholds
- Additional cable capacity

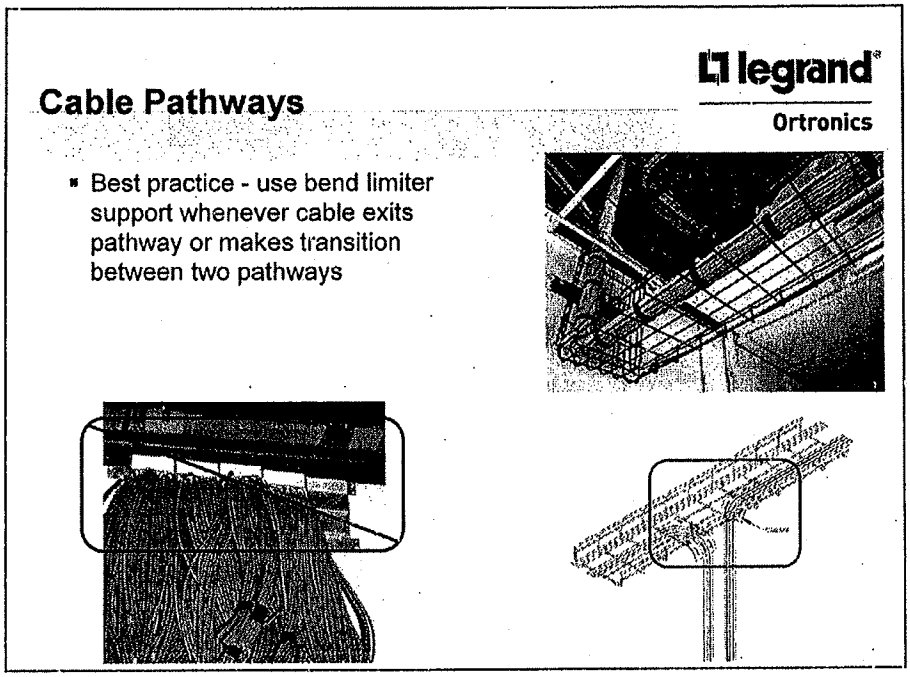
Mighty Mo® racks and cabinets
Ortronics® overhead pathway racks
Cablofil® cable trays
Mighty Mo® vertical and horizontal cable managers



Scalability

Designed to provide room to grow. Layer Zero solutions support future network design changes, computing power and technology upgrades; facilitating growth without major disruptions.

Mighty Mo racks and cabinets are **built with higher weight thresholds**, allowing equipment to be added as necessary. Our overhead cable pathway racks **fully integrate with Cablofil cable trays**, providing alternative cable pathways, as well as room for additional patch panels outside the cabinet. Mighty Mo systems offer **additional cable capacity** with larger cable channels, vertical managers and waterfall extensions.



It's no longer a matter of how we route Cat 5e cable and maintain the 4X bend radius. Educational and healthcare facilities are experiencing huge cable management challenges resulting from the expanding applications and cable required to support them. Let's take a look at some applications and the contribution Layer Zero™ has to a robust network performance.

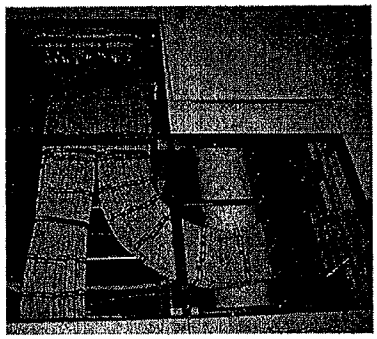
Use of waterfalls to support cable as it is routed between pathways or from a pathway into an equipment rack or cabinet will minimize signal deterioration resulting from kinking cables and not maintaining proper bend radius.

An associate recently visited a customer site where they were experiencing inconsistent performance on some of their nodes. When inspecting the TR it was noticed that no waterfall support had been installed on the basket tray where the cable was being routed down, into the racks to be terminated. The cables supporting nodes with the performance issues were located at the bottom of the cable bundle being routed from the tray into the rack which were kinked because of very tight bends.

Pathway Capacity
Adding Cable to Existing Pathways

legrand®
Ortronics

- Cable depth in pathway should not exceed 6"
- When adding cable tray in ceiling area leave at least 12" access above tray
- For raised floor applications leave 2" above tray side rails
- When cable tray is covered provide adequate clearance for installing or removing cover
- Always consult manufacturers fill recommendations prior to adding cable
- Where permitted by local codes, power and communications cable may share the same pathway
  - Physical barrier required between the two cable types



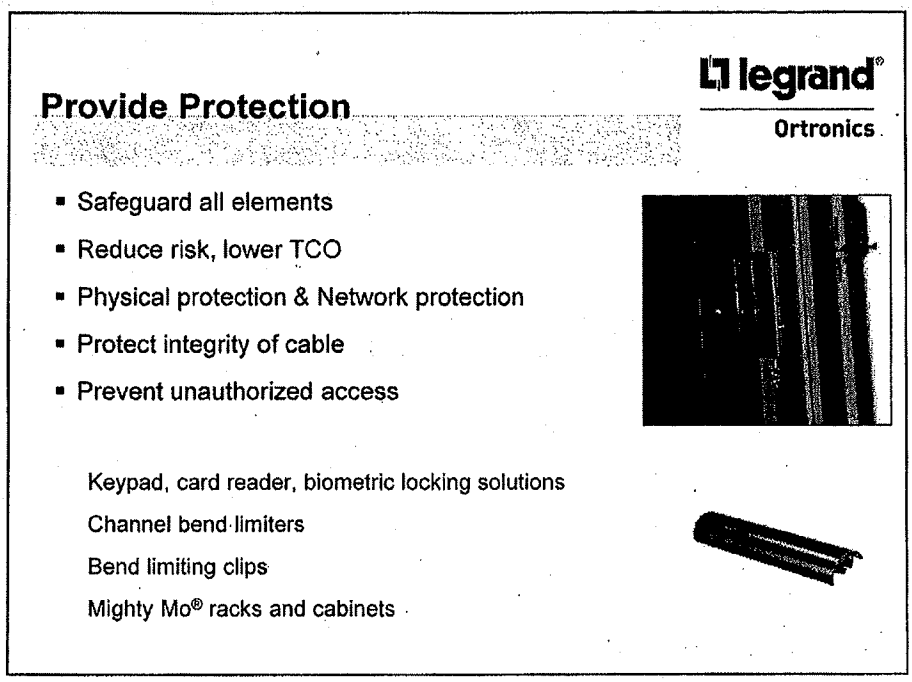
The type of pathway currently used or being specified for cable plant upgrades or new installations is an important consideration. In data center areas or large telecommunication rooms where large numbers of cables are being routed, there are a number of factors to consider.

"When cables are stacked in a solid bottom tray, the impedance of the cables on the bottom of the tray may be affected, essentially because the solid tray acts as a

ground plane, if installed correctly," states Lisa Huff, data center applications engineer for Berk-Tek.

"In addition, in critical locations, such as data centers, where airflow is a major concern, a preference would be to install mesh cable baskets or ladder

racking for overhead cable management between racks and rows," she adds.*
*Not an Open and Shut Case", Reel Time, CBM – Sept 2008



Protection

Protect customer investment by reducing the risk of equipment failure at all points of the infrastructure: airflow management, thermal management and cable management. **Reduction in risk lowers the total cost of ownership.**

Protecting the network means safeguarding all elements, not just switches and cables. Prevent unauthorized access to servers with locking solutions. Extended vertical managers create smoother bend radiuses, reducing stress on switch ports. Honeycomb rails and airflow baffles ensure more precise cooling and lower temperatures.

Optimize Performance

legrand® Ortronics

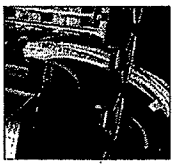
- Optimize cable support and patch cord routing
- Minimize signal loss by controlling bending
- Proper bend radiuses eliminate kinking
- Reduce tension on plugs and jacks
- Prevent stress and damage to switch ports

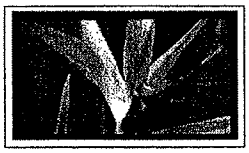
Mighty Mo® cable management systems

Mighty Mo® waterfall

Bend limiting clips

Cablofil® wire mesh cable trays





Performance

The picture of the flower demonstrates a before and after of what can happen to a signal when cable is kinked or bent.

Maximize network performance by **minimizing signal loss due to improper cable support** and provide proper support for network equipment.

Bend limiting clips, channel bend limiters and waterfalls ensure proper bend radiuses.

Large cable management fingers and deeper cable channels manage patch cords for better airflow and more traceable routings.

The web on the vertical managers extend beyond the face of the switch to prevent strain on the cables.

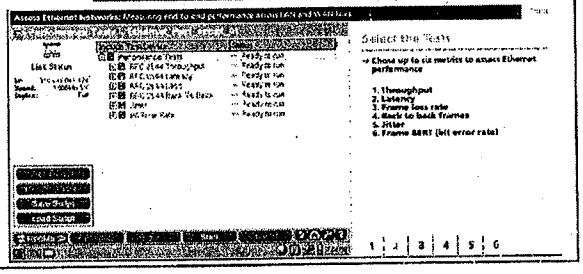
Wire mesh cable trays enable airflow across cable while reducing floor loading.

Physical and Physical Support Layers Impact on Ethernet Network Performance

legrand® Ortronics

- Signal strength is measured in decibels(dBs)
- Each loss of 3dB represents an approximate 50% loss of signal power
- Physical support affects both copper and fiber performance

	CRC Errors	Frame Errors	Retrans-missions	Fragment
Termination Practices	X	X	X	X
Installation Practices	X	X	X	X
Crosstalk Performance	X	X	X	X
Balance	X	X	X	X
Return Loss	X	X	X	X



The importance of having a robust infrastructure is reinforced when you look at its impact on signal strength and network performance. Ethernet networks can experience several different types of problems that can result in slow response times, application sluggishness, and even a loss of link connection. These problems can be caused by issues associated with the physical media and how it is managed during and after installation.

The physical attributes of the components, cable – connectivity –cords, can affect the overall transmission performance. These are generally controlled by the manufacturer in the design and manufacturing of the components as we have just looked at. Balance, which is an important characteristic in the ability of a twisted pair cabling system to resist the influence of external noise is engineered into the cable and connectivity through proper engineering and most importantly highly controlled manufacturing processes.

Crosstalk and Return Loss performance can also be affected by installation practice as well. Termination practices such as the untwisting of pairs, or the stripping back of the cable jacket more than necessary can cause problems.

Installation practices, such as over bending (exceeding bend radius) or exerting too much pull force on UTP or optical fiber cables during installation may contribute to crosstalk and return loss issue, which impact efficient ethernet network performance.

dB = Decibel –used as a measure signal strength

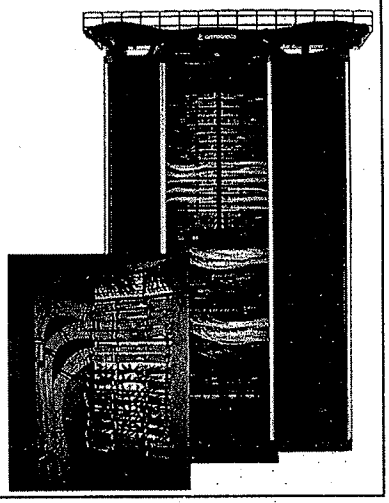
CRC – Cyclic Redundancy Checks

Support High Density

legrand®
Ortronics

- Optimize network real estate
- Allow for easier MACs
- Support for up to 1340 network ports
- Deeper management channels
- Adjustable mounting rails

Mighty Mo® 10 server rack
Mighty Mo® cable management cage
Mighty Mo® cable management spools



Density

Higher density drives up electrical costs because it dramatically drives down the efficiency of conventional air conditioning systems. Density demands of virtualization, convergence and consolidation require greater support.

Layer Zero can help you optimize your network real estate by controlling cable bulk, allowing for more patch cords per rack unit, while still increasing cooling. The Mighty Mo 10 rack has room to support up to 1,340 network ports and capacity for up to 48 patch cords per unit on a single side of the equipment, with deeper cable channels providing ample room even when the switch is loaded to capacity.

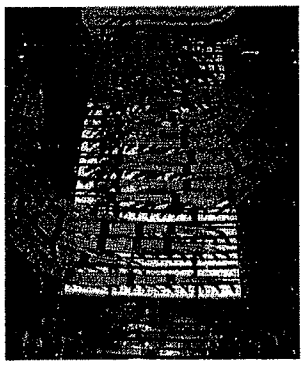
Mighty Mo cable managers have a larger finger design that encourages traceable routing of individual patch cords.

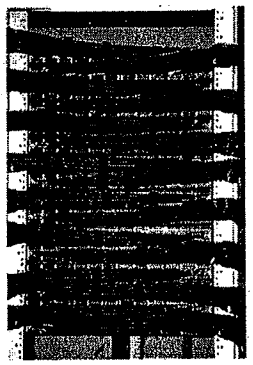
Cable management spools effectively manage excess copper or fiber cable slack. They mount at rack unit intervals, providing flexibility and ensuring proper bend radius for cables.

Cable Management and Physical Support Foundation

legrand® Ortronics

- Simplifies system maintenance
- Extends useful life of system





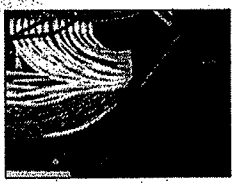
Cable management is important for several reasons:

1) Simplifies adds/moves/changes
2) Ensures proper bend radii
3) Allows for proper airflow

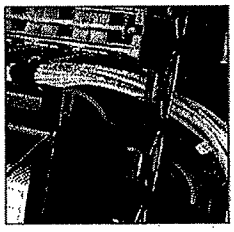
Advanced Cable Management

legrand®
Ortronics

- Vertical manager with switch port protection
  - Prevent stress and damage to the switch ports even when the vertical manager is loaded to full capacity



- Bend limiting copper and fiber cords
  - Designed to protect cabling, eliminating kinks and providing the proper bend radius for fiber jumpers



Vertical Manager with Switch Port Protection – The web on the vertical managers extend beyond the face of the switch to give cable/connections a smoother bend radius and prevent additional stress and damage to the switch ports even when the vertical manager is loaded to full capacity. Vertical managers provide ample capacity for a minimum of 48 Category 6A patch cords per rack unit on a single side of the equipment.

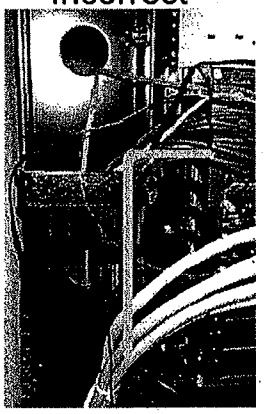
Bend Limiting Clips – A patented and unique product, bend limiting clips are mounted to the fingers on the vertical managers

Overhead Pathway Rack – Mounted on either basket tray or ladder racking, flexibility and efficient space utilization of cabinet space with patching outside of the cabinet

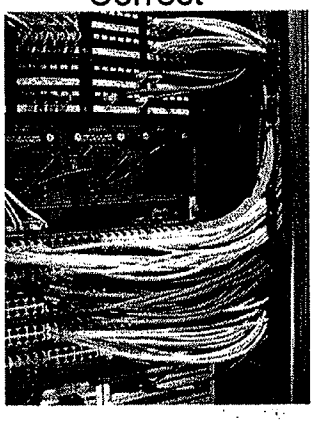
Maximize Network Performance with Effective Cable Routing at the Rack

legrand®
Ortronics

Incorrect



Correct



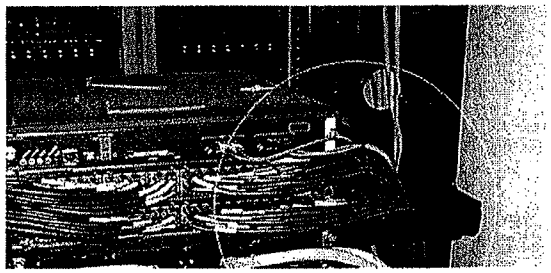
These examples of jeopardized connections and cables are typical of systems where physical support products are developed without the benefit of internal network experts

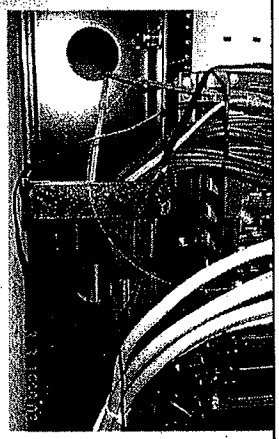
The vertical cable managers are recessed flush with the face of the switch and there is no bend limitation.

Maximize Network Performance with Effective Cable Routing at the Rack

legrand®
Ortronics

- Protecting the network means safeguarding the switch ports in addition to the copper and fiber cords
- Estimated cost per copper switch port: $400 - $1500





Consideration for maintaining the integrity of the network equipment ports is an important Layer Zero™ consideration. Many equipment manufacturers include patch cord managers with their equipment that do not compensate for the stress that can be introduced at the network port by poor patch cord routing practices.

In this photo, which is not an uncommon sight, the outboard equipment ports have been damaged because of the uneven pressure placed on the pins as tension on the cord causes misalignment. The cost of replacing a patch cord is insignificant, but a damaged equipment port cannot be replaced when it becomes disabled.

Cable Pathways
Bonding and Grounding

legrand®
Ortronics

"When cables are stacked in a solid bottom tray, the impedance of the cables on the bottom of the tray may be affected, essentially because the solid tray acts as aground plane if installed correctly,"

- Basket tray's mesh construction enhances airflow, a critical component in data center environments
- Properly installed metallic tray also absorbs electro-magnetic noise, enhancing network performance

Pending NEC 2011 code change:
"Metal cable tray containing non-power conductors (communication, data, signal, etc.) shall be electrically continuous, through listed connections or the use of an insulated stranded bonding jumper not smaller than a 10 AWG."

*Not an Open and Shut Case", Reel Time, CBM – Sept 2008

Pathway decisions should involve multiple considerations including airflow and proper bonding and earthing practices. Pathways must be properly bonded and earthed to the building ground in order to minimized EMI interference.

Metallic cable tray, whether basket-tray, cable tray or solid, when properly bonded will provide a path for electro-magnetic interference to be drained off and minimize noise.

Important Factors for Reliable Noise Reduction:

•Splice/bond wire mesh trays to ensure continuity

•Earth trays every 60ft to provide a low impedance path (less than 1 Ohms)

•Provide 4 inches or better distance from power conductors (2 inches w/ barrier)

•Avoid parallel runs of cables of different groups

Steel Structures Provide Shielding. The metal structure of cable tray absorbs electromagnetic disturbances and converts it into noise current.

Best practices to Ground Data Cable Tray for Noise:

•Bond entire tray system together

•Use listed connections/connectors

•Test from Tray to each TGB (telecommunications grounding busbar) to determine least resistance path

•Make single grounding connection from cable tray to "best" TGB.

As noted in the NEC Committee Report on Proposals, 2010 Annual Revision Cycle, Code-Making Panel 8 has voted to accept a Code change submitted by David A. Williams, Delta Township, (Log #3622 NEC-P08). Williams recommended adding a second sentence to 392.7(A) that would read as follows: "Metal cable tray containing non-power conductors (communication, data, signal, etc.) shall be electrically continuous, through listed connections or the use of an insulated stranded bonding jumper not smaller than a 10 AWG." He notes, "The NEC presently does not require cable trays with non-power conductors to be properly bonded. The NECA/NEMA 105-2007 Standard for Installing Metal Cable Tray Systems provides bonding requirements in Section 4.7.3.2 for installations of only non-power conductors. This needs to be covered in the NEC." He adds, "Most contractors do not have access to the NEIS standards."

The document is open for public review and comment through October 23, 2009. You can download an electronic version of the report via the NFPA Web site.

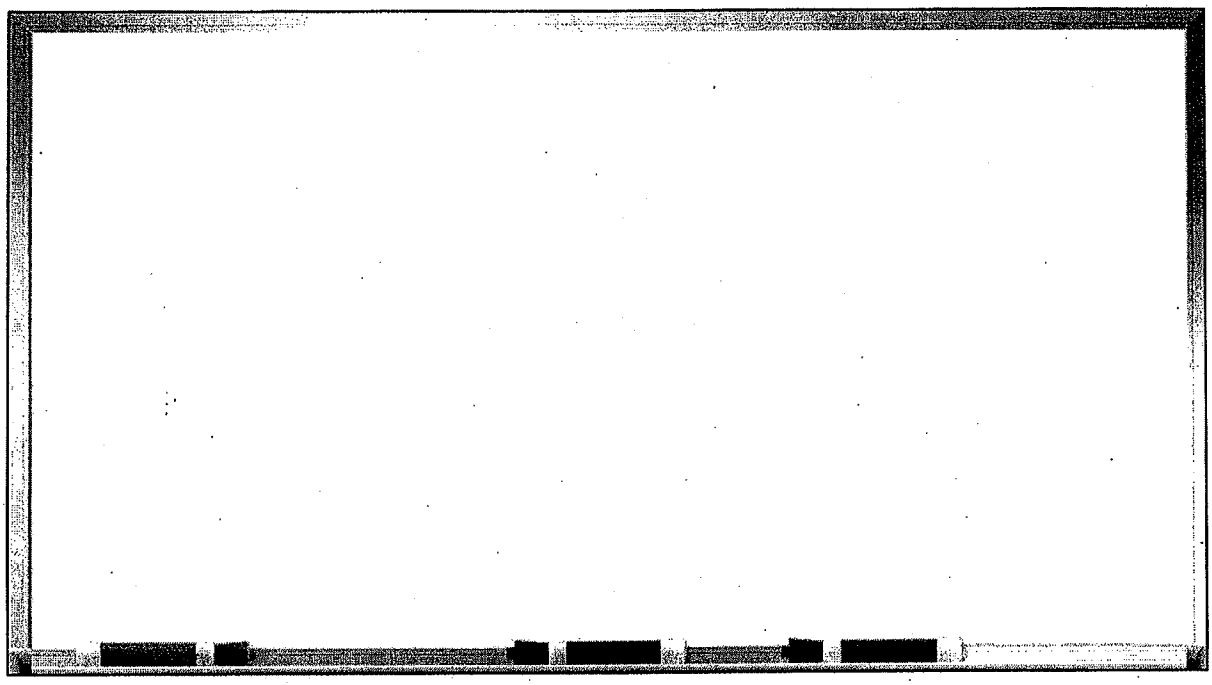
http://www.nfpa.org/Assets/Files/PDF/ROP/70-A2010-ROP.pdf

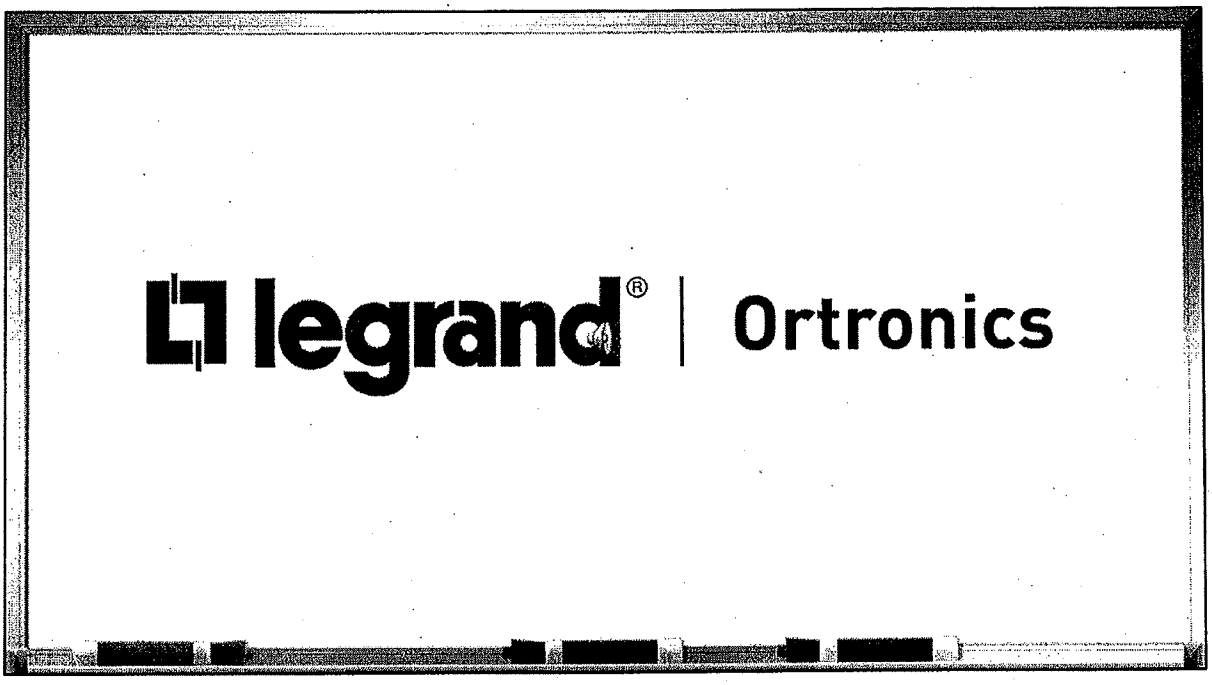
Posted 6 days ago | Delete discussion

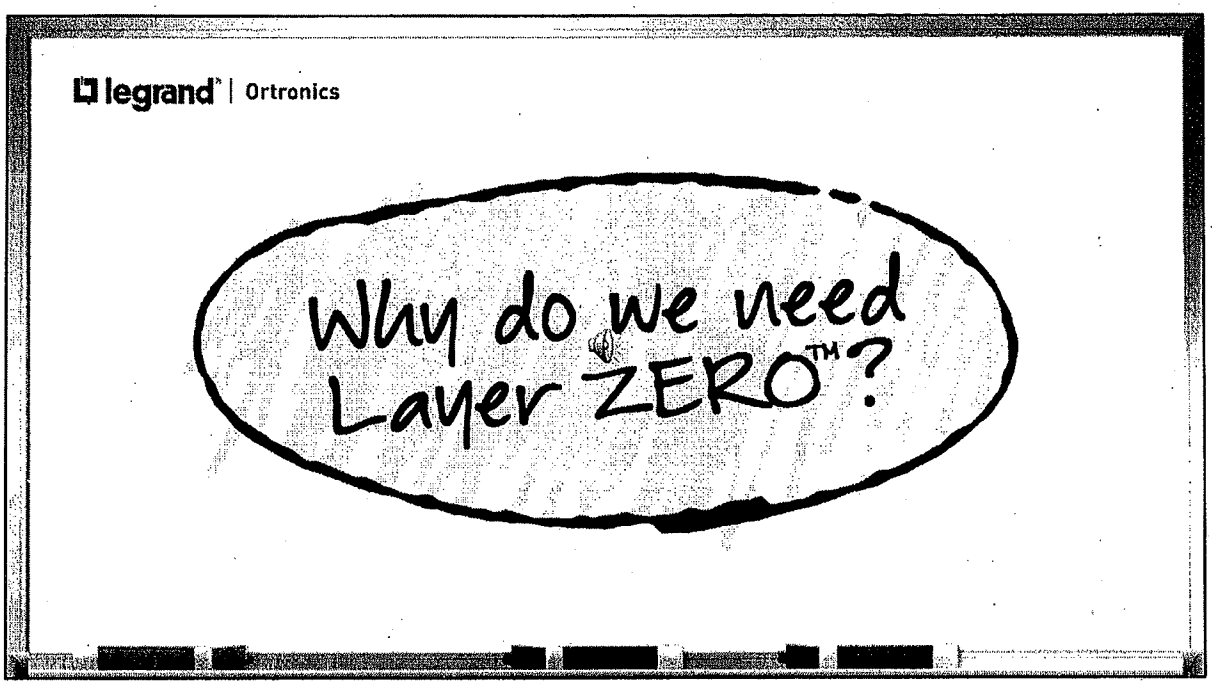
EXHIBIT Y

Cancellation Proceeding No. 92054573
LayerZero Power Systems, Inc. v. Ortronics, Inc.

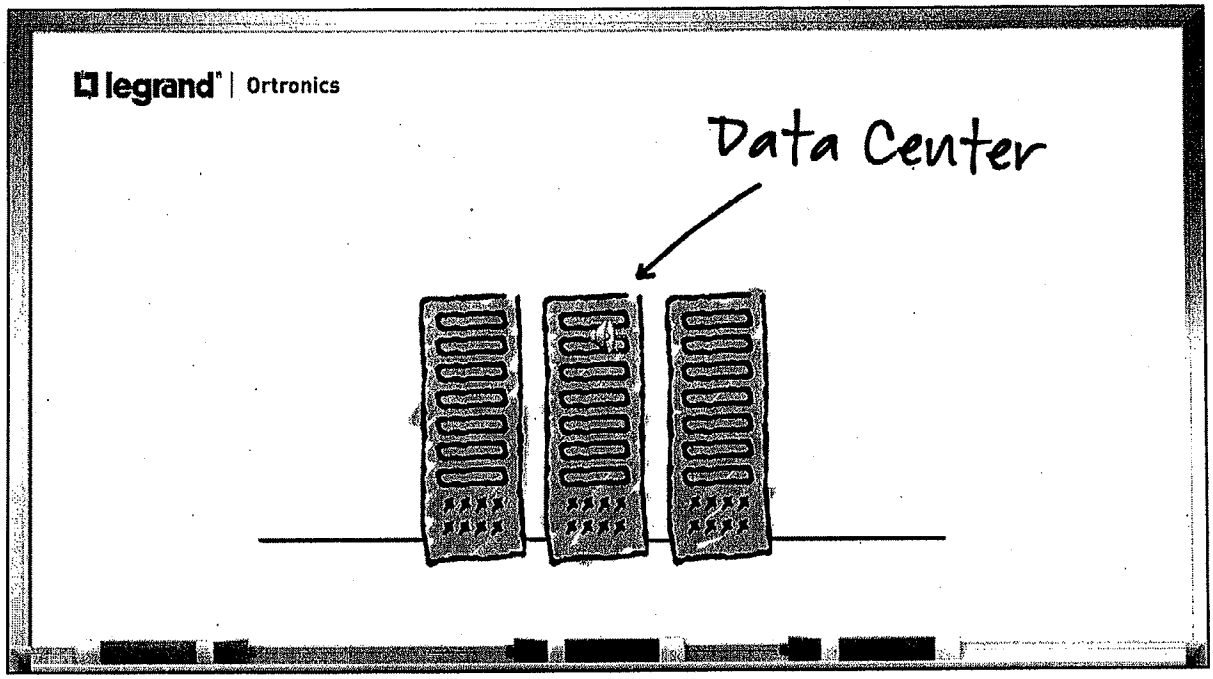
Exhibit Offered by Ortronics, Inc.




legrand®
Ortronics

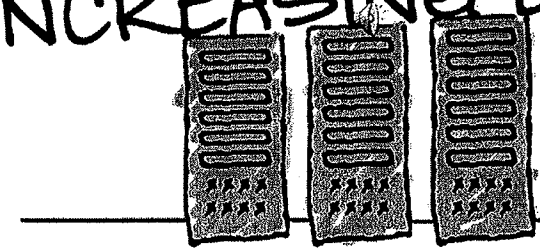

legrand | Ortronics
Why do we need Layer ZERO™?

legrand® | Ortronics



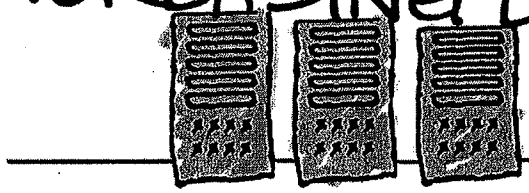
legrand® | Ortronics

INCREASING LOADS

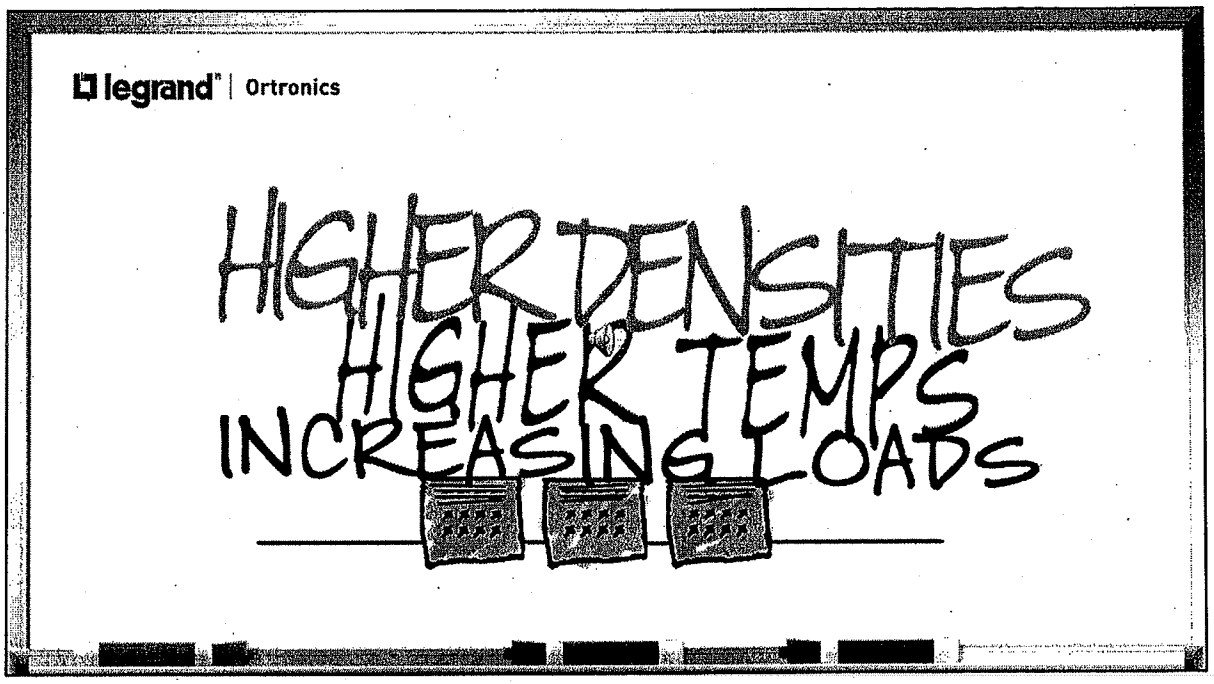


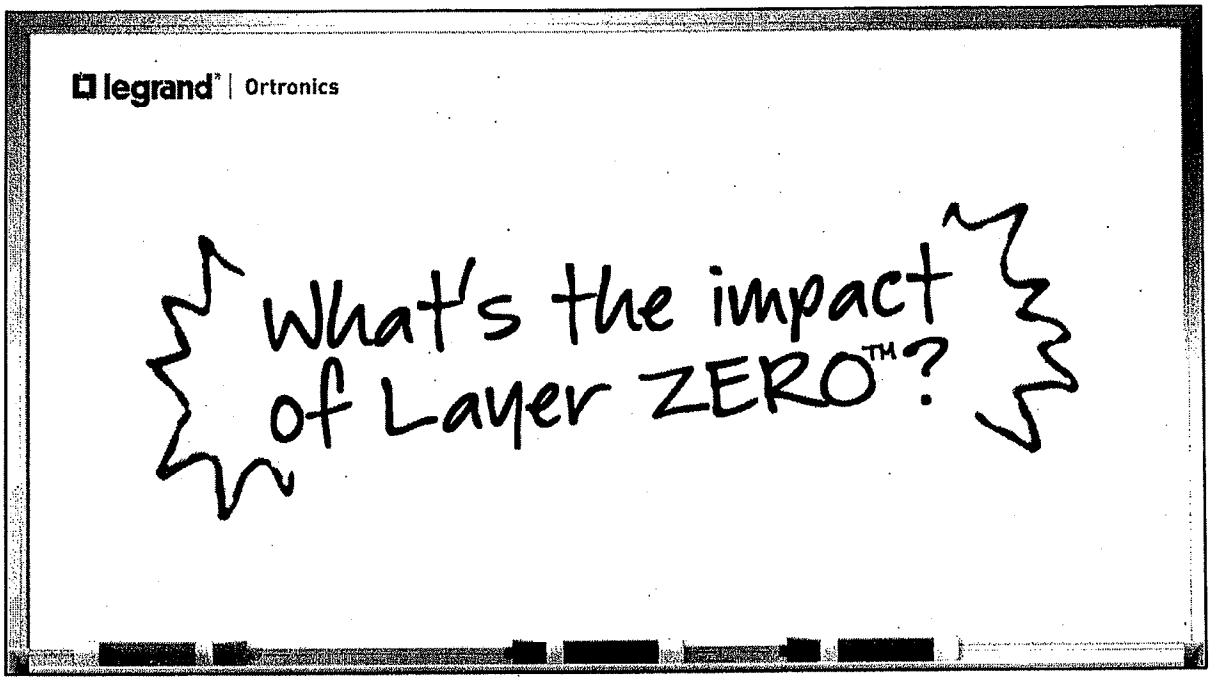
legrand® | Ortronics

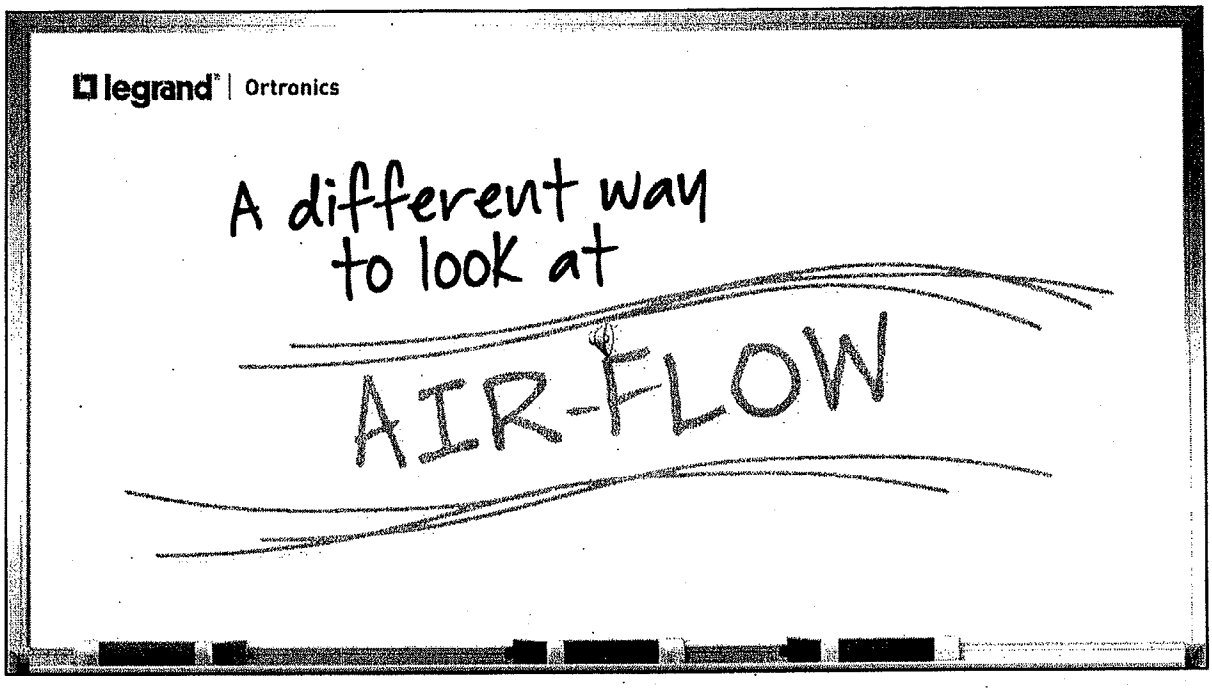
HIGHER TEMPS INCREASING LOADS

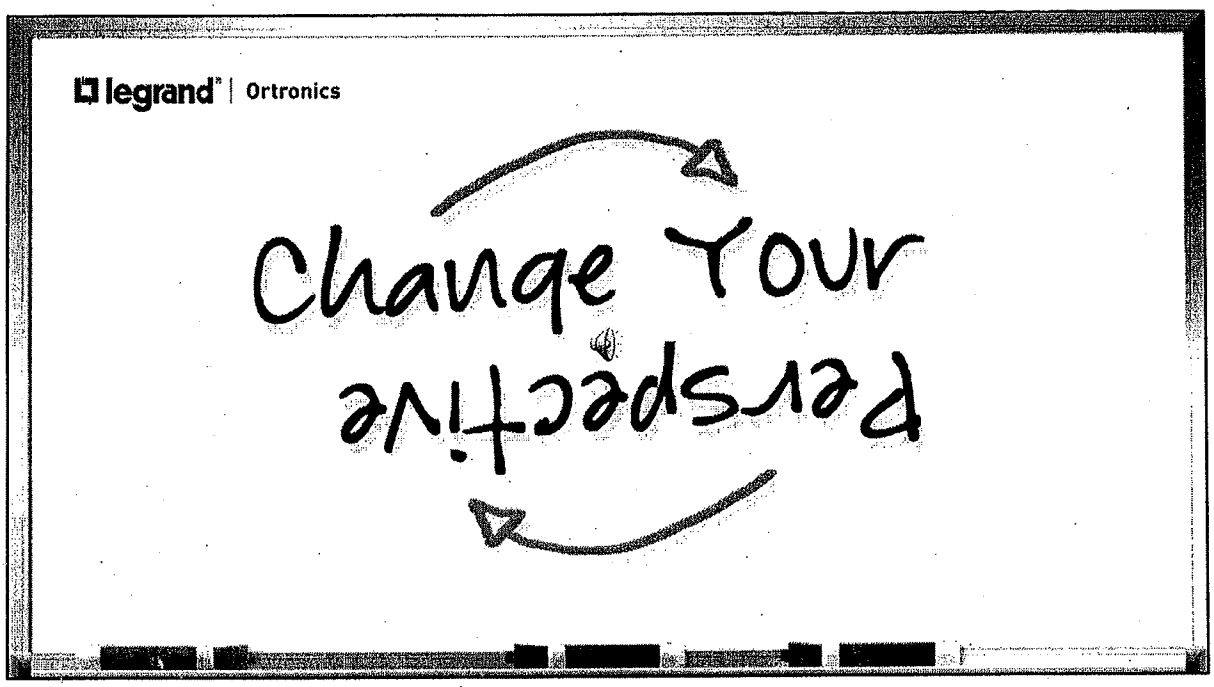


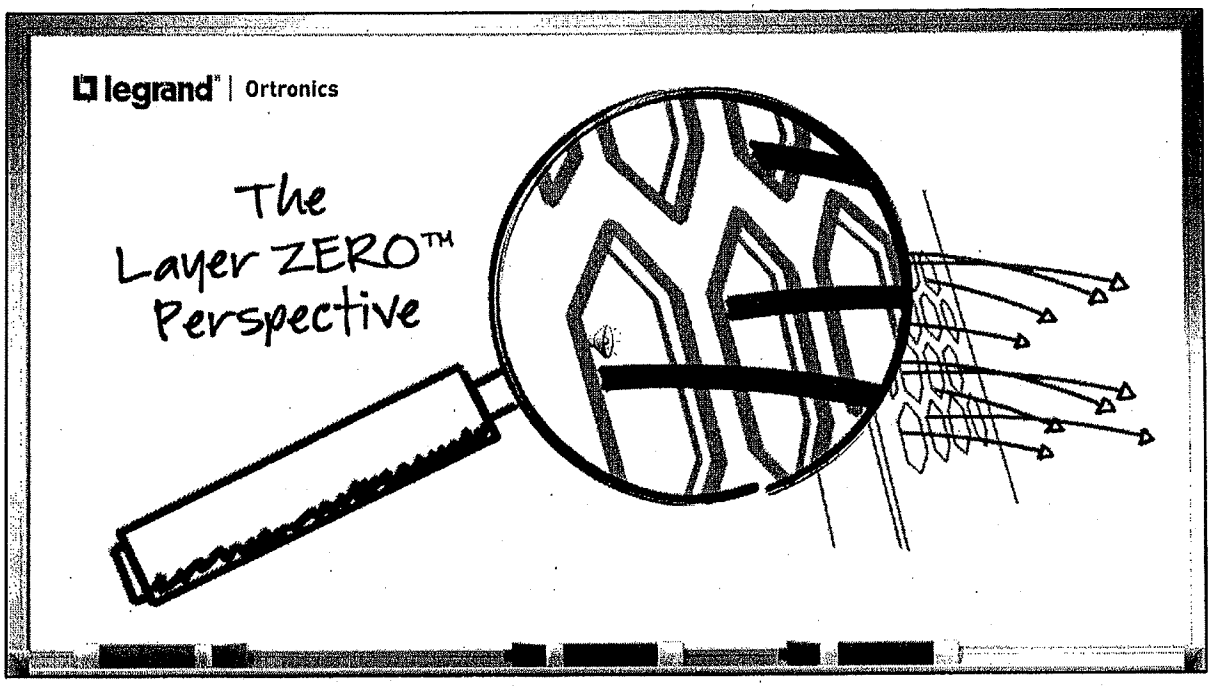
legrand® | Ortronics

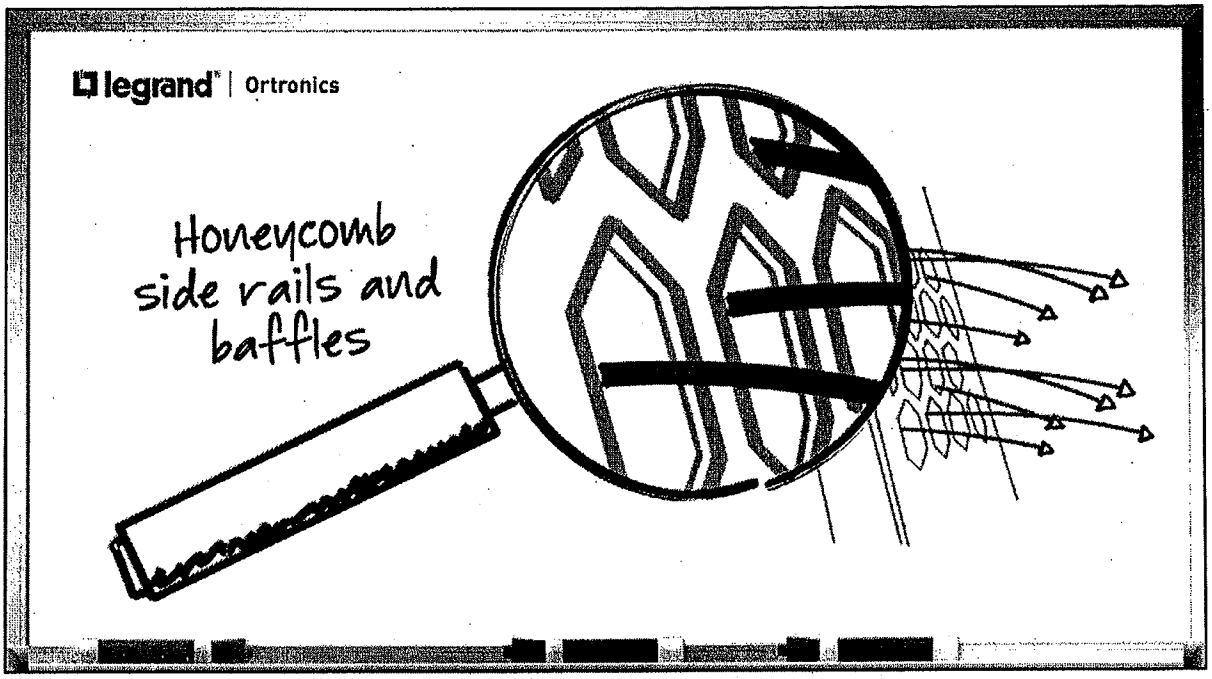



legrand | Ortronics
What's the impact of Layer ZERO™?

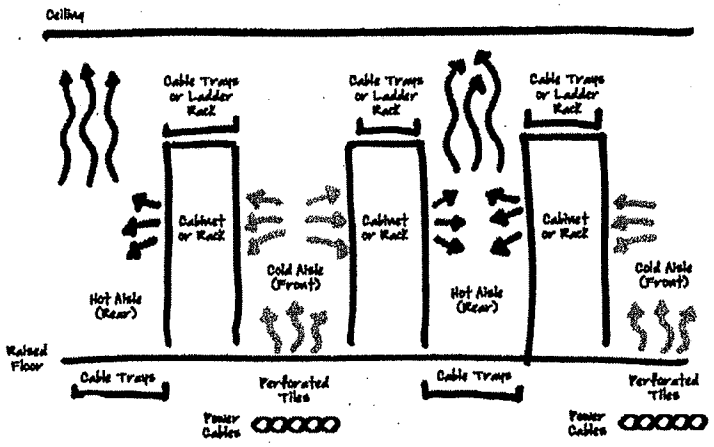

legrand | Ortronics
A different way
to look at
AIR-FLOW


legrand | Ortronics
Change Your Perspective

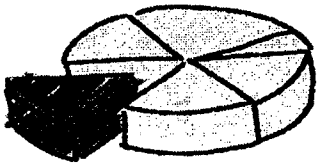

legrand® | Ortronics
The
Layer ZERO™
Perspective


legrand | Ortronics
Honeycomb side rails and baffles

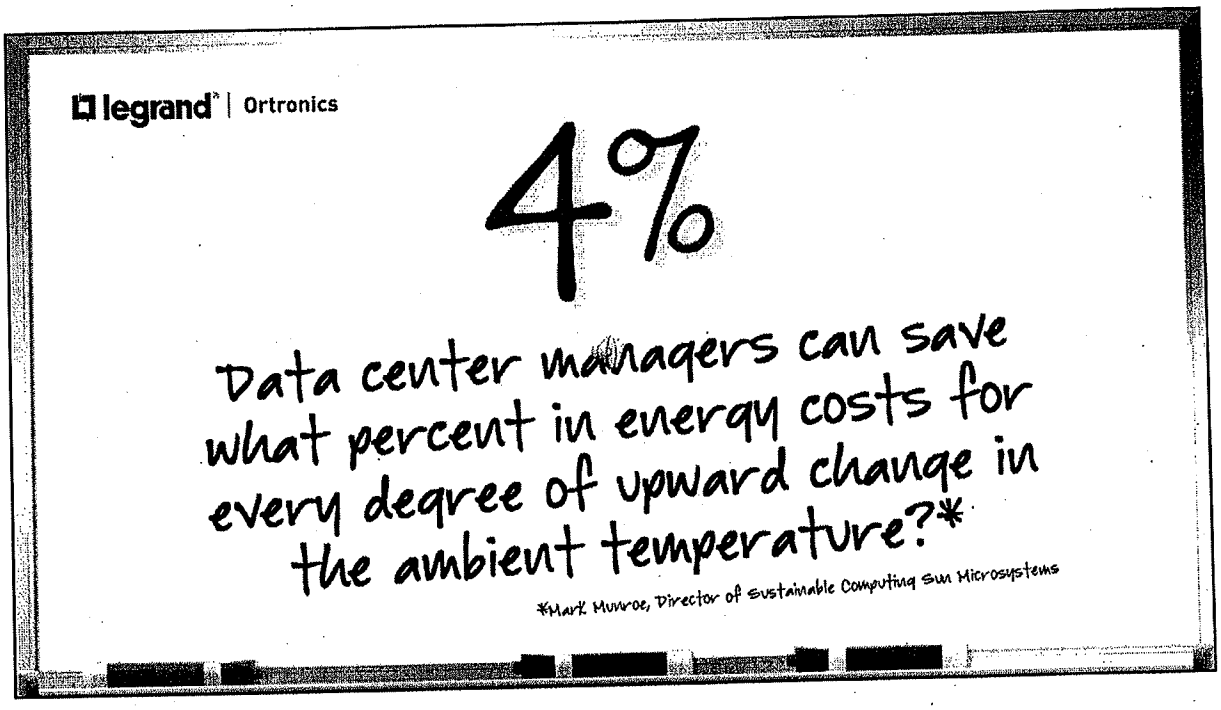
legrand® | Ortronics

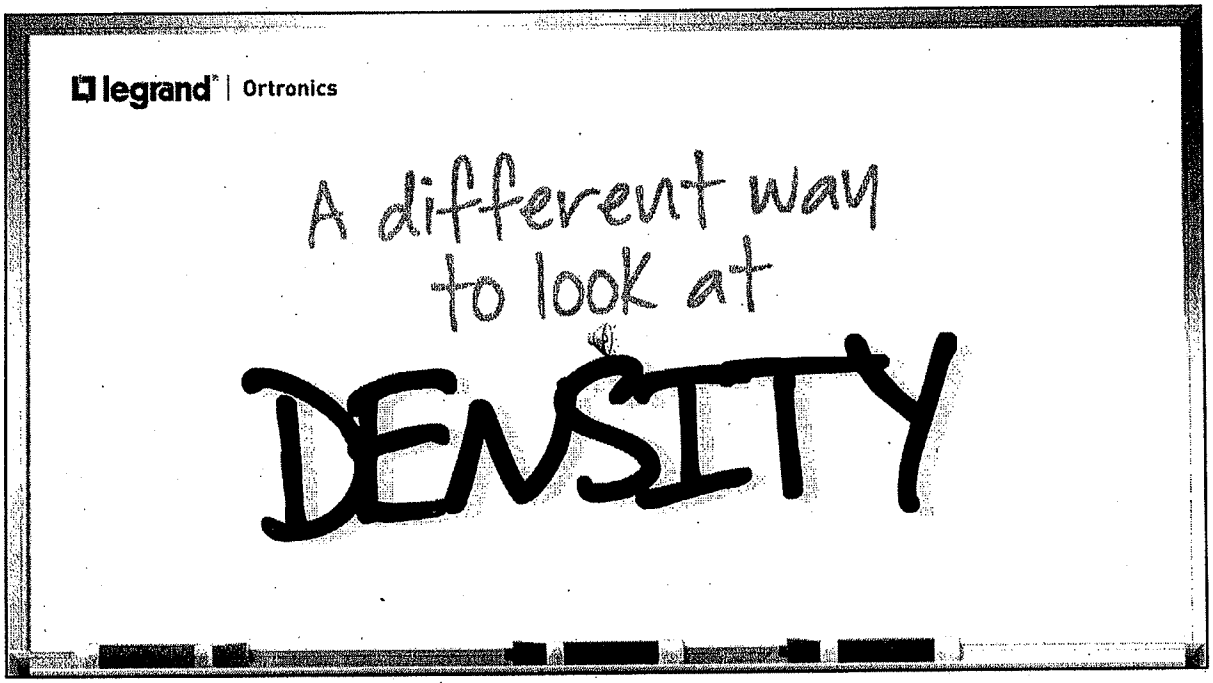


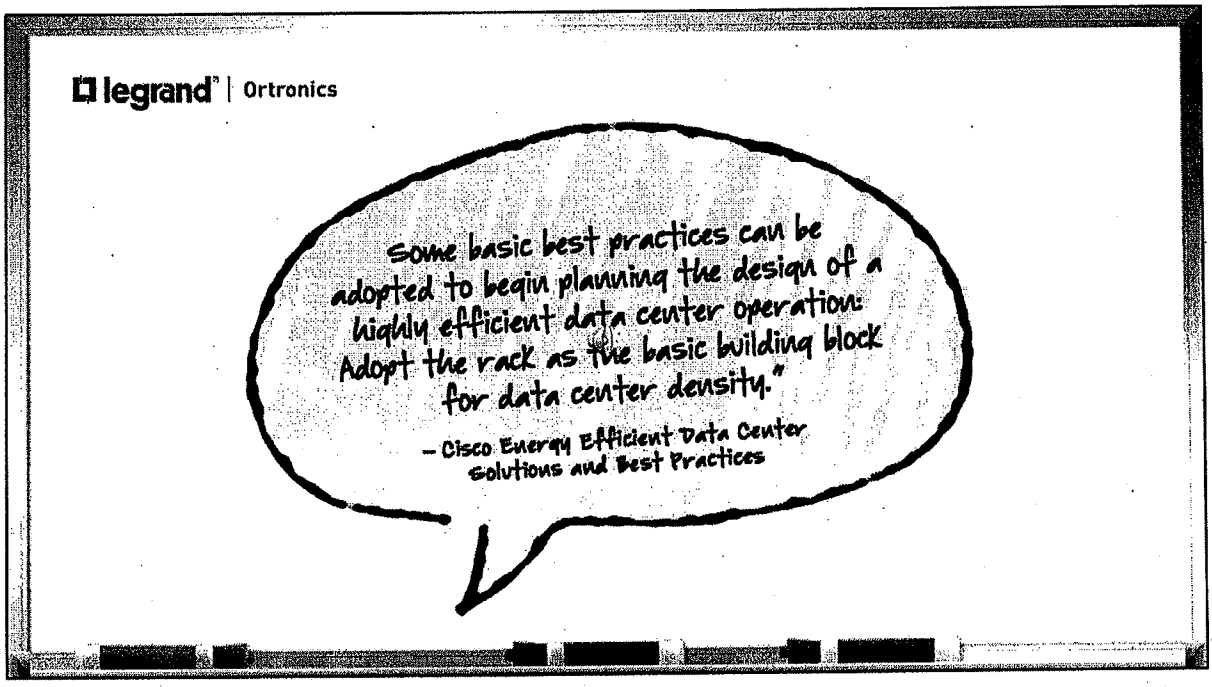
legrand® | Ortronics

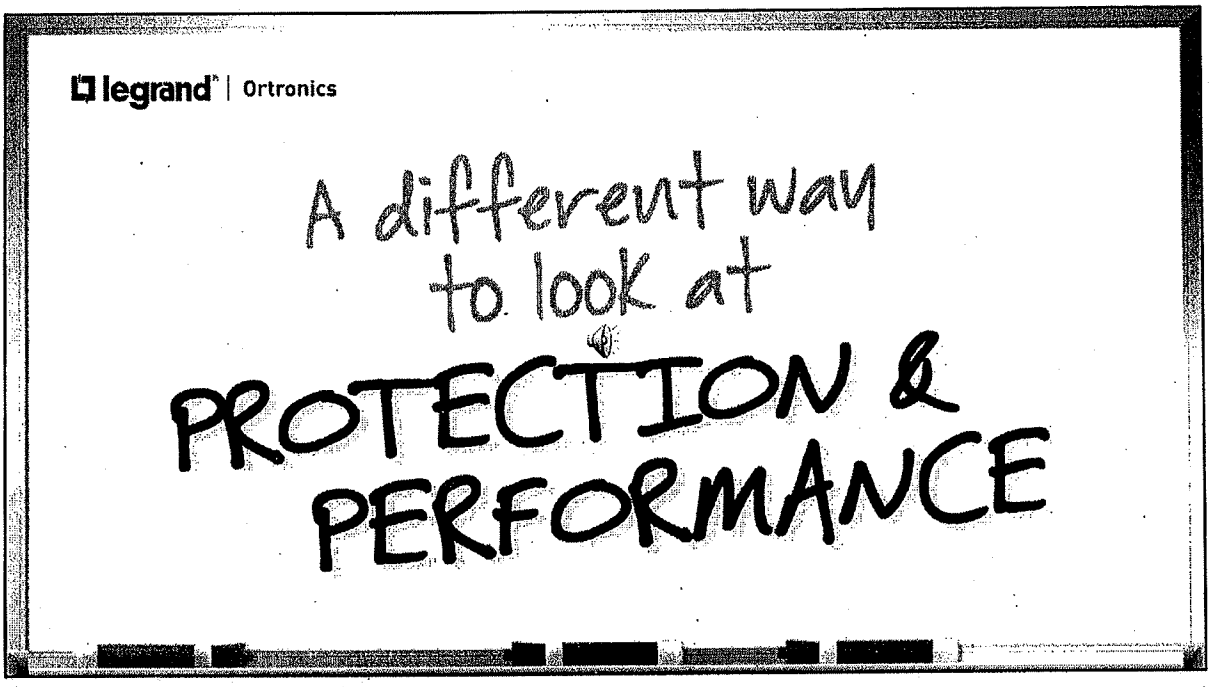


Data center managers can save what percent in energy costs for every degree of upward change in the ambient temperature?


legrand | Ortronics
4%
Data center managers can save what percent in energy costs for every degree of upward change in the ambient temperature?*
*Mark Monroe, Director of Sustainable Computing Sun Microsystems


legrand® | Ortronics
A different way
to look at
DENSITY

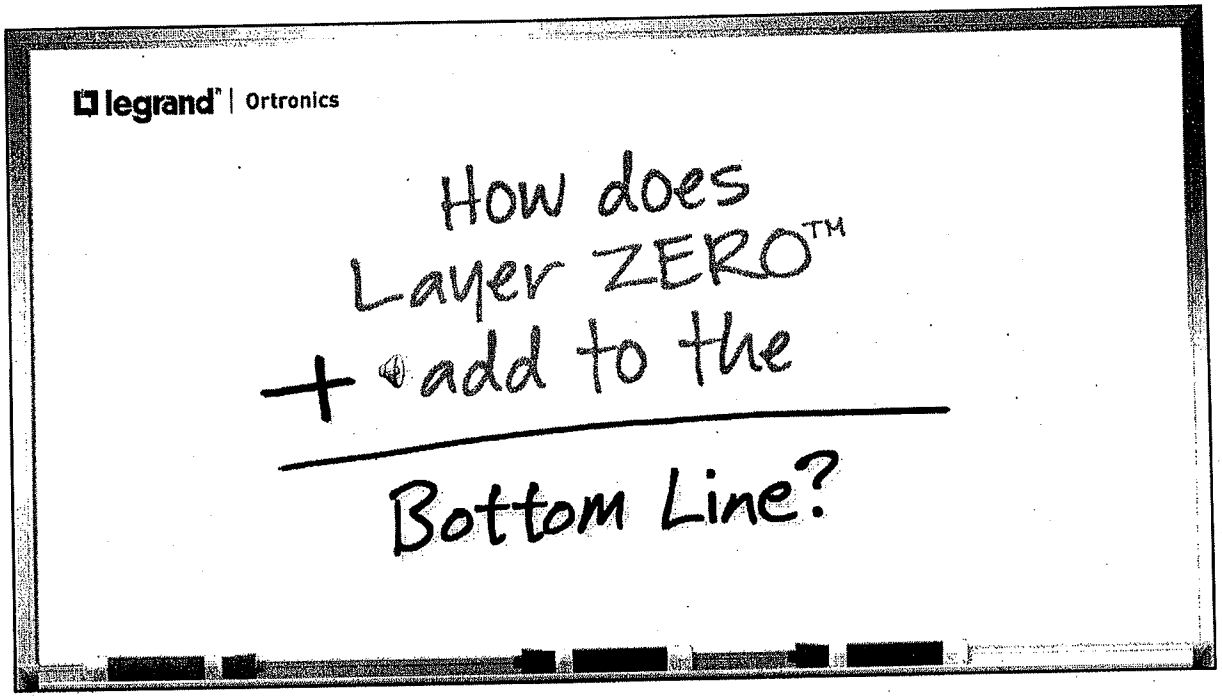

legrand | Ortronics
Some basic best practices can be adopted to begin planning the design of a highly efficient data center operation: Adopt the rack as the basic building block for data center density."
– Cisco Energy Efficient Data Center Solutions and Best Practices


legrand | Ortronics
A different way
to look at
PROTECTION &
PERFORMANCE

legrand® | Ortronics

LAYER ZERO SOLUTIONS CAN:

- Lower Overall Temperature
- Reduce Risk of Equipment Failure
- Enhance System Performance
- Provide Siquificant Savings

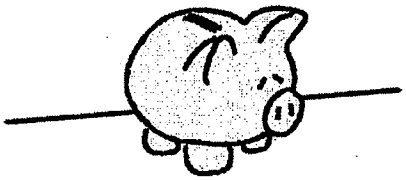

legrand® | Ortronics
How does
Layer ZERO™
+ add to the
Bottom Line?

legrand® | Ortronics

Passive cooling, proper airflow and cable management can allow an increase to the overall ambient temperature threshold by up to 15%.

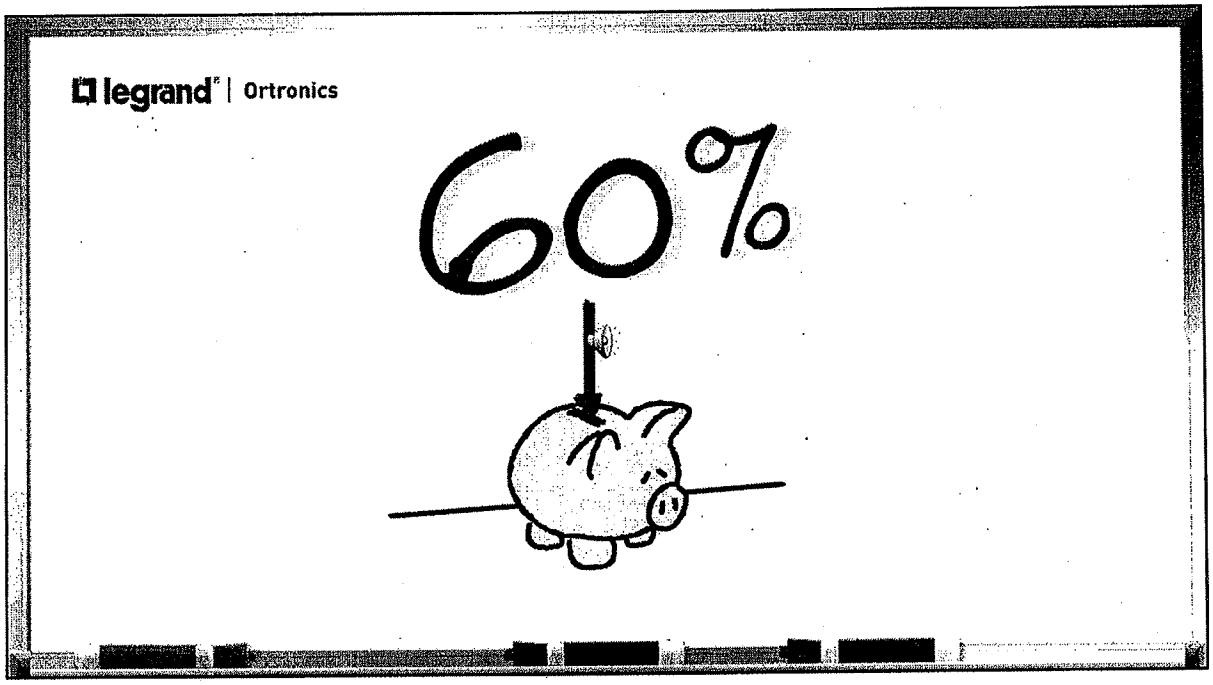
If every 1 Degree increase in set point = 4% savings in energy cost.

legrand® | Ortronics



How much can you save by incorporating Layer ZERO™?

legrand® | Ortronics



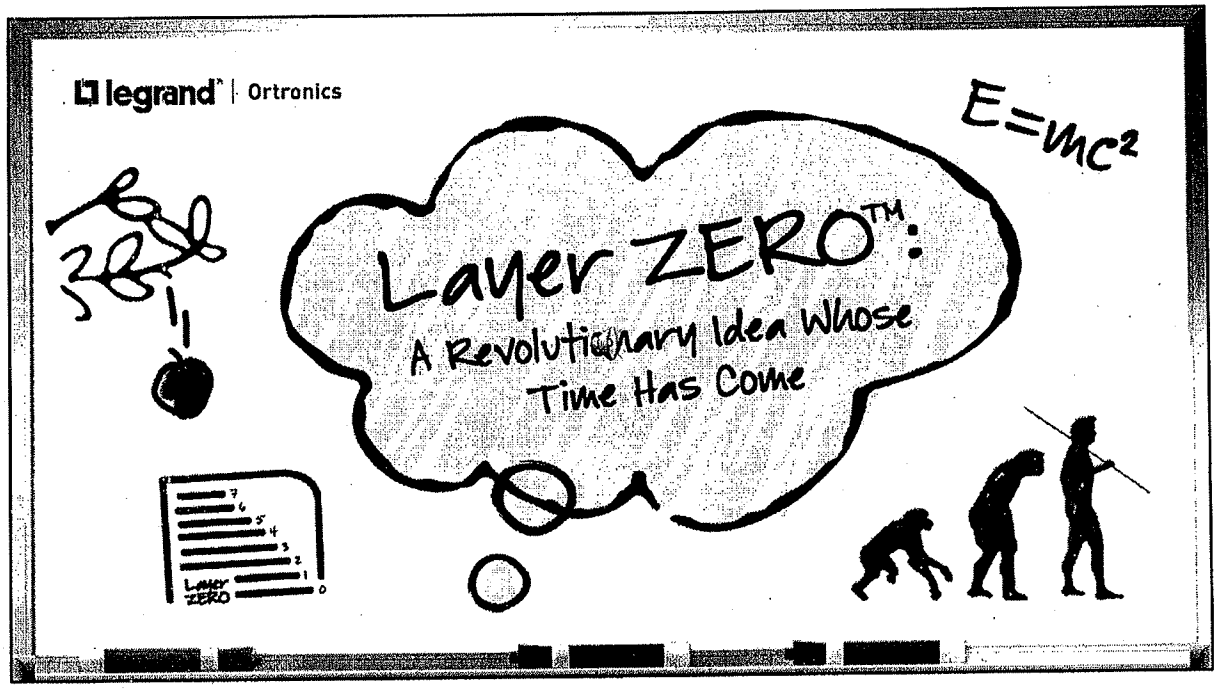

legrand | Ortronics
E=mc²
Layer ZERO™:
A Revolutionary Idea Whose Time Has Come
LAYER ZERO

EXHIBIT Z

Cancellation Proceeding No. 92054573
LayerZero Power Systems, Inc. v. Ortronics, Inc.

Exhibit Offered by Ortronics, Inc.

INTERNATIONAL CONTRACTOR CERTIFICATION, WARRANTIES AND TRAINING

Why choose an Ortronics Certified Contractor?

In addition to purchasing products designed and manufactured to Ortronics' specifications, quality installation practices maximize the performance of a network. Selecting the best trained installer will prevent performance degradation due to poor installation practices.

Ortronics has the most selective program worldwide with the best installers in the industry participating in this exclusive program. The global Certified Contractor selection is managed locally by Ortronics area managers and sales representatives. Participation in this contractor partnership program is limited to maintain the best installation support for our customers. Even within our program there is differentiation between the three different tiers – Certified Installer (CI), Certified Installer Plus (CIP), Certified Installer Plus-Enterprise Solutions Partners (CIP-ESP). This allows us to recommend the best contractors for a customer's unique requirement whether local or global in scope.

Each Certified Contractor company must meet and maintain the minimum training level that requires completing an online eCertification for CI, CIP and CIP-ESP tiers. At least one qualified manager to attend a 2-day Management Certification course, and at least 30% of company field technicians successfully complete a 1-day copper, optical fiber and infrastructure support installation course if a contractor is a CIP or CIP-ESP tier contractor. Each Certified Contractor company is evaluated every 12 months to ensure Ortronics is working with the best installers in the industry locally and globally.

Only an Ortronics Certified Contractor company in good standing may provide extended project warranties in partnership with Ortronics.

Why is a warranty important to the customer?

An Ortronics warranty ensures that the installed products are free from defects in material and workmanship and will support application developed by industry organizations like IEEE or ATM Forum. The products are warranted to meet or exceed the specifications of standards organizations including, but not limited to, ISO/IEC and TIA. Under the extended warranties products are repaired or replaced and labor is paid by Ortronics. This offers customers the security of knowing they will receive the best network Infrastructure support system and that the system will maintain its performance integrity for years to come.

BASIC PRODUCT WARRANTY

Guarantee:	Product repair or replacement for 5 years from the time of purchase excluding labor costs.
Explanation:	This warranty is the standard warranty issued to the end user on Ortronics connectivity product, racks, cable management and fiber products when purchased from an approved distributor.

EXTENDED PRODUCT WARRANTY

Guarantee: Product repair or replacement for up to 25 years from the time of purchase including labor costs.

Explanation: This warranty is issued when an Ortronics certified installer (CI/CIP/CIP-ESP) installs Ortronics connectivity (Clarity or TechChoice) with Clarity cable or cable from an approved manufacturer (found at www.ortronics.com). All requirements of the Ortronics Certification and Warranty program must be met. The project must be registered for warranty and test data submitted to Ortronics.

APPLICATION ASSURANCE WARRANTY

Guarantee: Product repair or replacement for up to 15 years from the time of purchase including labor costs. Performance and Applications Assurance that guarantees applications designed to run over the specified cabling category will do so.

Explanation: This warranty is issued when an Ortronics certified installer (CIP/CIP-ESP) installs Ortronics connectivity including Ortronics patch cords (Clarity or TechChoice) with Clarity cable or cable from an approved manufacturer (found at www.ortronics.com). All requirements of the Ortronics Certification and Warranty program must be met. The project must be registered for warranty and test data submitted to Ortronics.

CLARITY PRODUCT AND APPLICATION ASSURANCE WARRANTY

Guarantee: Product repair or replacement for up to 25 years from the time of purchase including labor costs. Performance is guaranteed above the Standards and are stated on the specific solution datasheet.

Explanation: This warranty is issued when an Ortronics certified installer (CIP/CIP-ESP) installs Ortronics Clarity connectivity including Ortronics Clarity patch cords and Clarity cable. All requirements of the Ortronics Certification and Warranty program must be met. The project must be registered for warranty and test data submitted to Ortronics.

Training

Protecting the investment in a structured cabling system is one of the main concerns of customers today. The network infrastructure support system provides a necessary foundation for a network to function effectively. Problems identified once the network becomes active can be extremely costly to correct and may affect mission-critical system networks. Ortronics addresses installation practices –

- By providing a select group of Certified Contractors, globally, who guarantee their workmanship
- By training the best consultants, architects and design engineers
- By providing education for the customer – information on today's leading technology and the latest standards
- By offering live and online courses to support immediate and ongoing training demands for customers, consultants and contractors.

What are the available Ortronics training courses?

CONTRACTOR CERTIFICATION TRAINING

Online eCertification Course: The Technician eCertification course reviews installation best practices for copper, optical fiber and physical support. The sessions will take you from site preparation through testing and warranty submission. The seven modules will use power point and video to provide valuable information pertaining to the telecommunications industry. 5 BICSI CECs received for successful completion. CI, CIP and CIP-ESP technicians must successfully complete this course to become Certified. Course Certification is good for five years.

Certified Technician Course: Technicians who successfully complete this 1-day live course will benefit from the latest standards-based training on installation best practices for current and emerging technology. These practices will be reinforced by the review of transmission fundamentals that impact network performance. The curriculum also includes hands on practice with current copper and optical fiber solutions that includes proper testing and troubleshooting guidelines. The class is designed to augment field experience and reinforce pride in the valuable role of the telecommunications contractor. 6 BICSI CECs received for successful completion. CIP and CIP-ESP technicians must successfully complete this course to become Certified. Course Certification is good for five years.

Management Certification Course: The Management Certification course is designed to provide top-level managers with the latest information on telecommunications industry standards and installation practices, new Ortronics products and discussions on emerging technology in expanding markets like data centers and healthcare. The training will also cover

- Labor saving installation practices for Ortronics and Legrand Data Communicaitons solutions
- Layer Zero qualification - installation and thermal management best practices that assure maximized customer network performance
- Review important certification program components that can enhance profitability on design-build projects
- Learn installation and testing process for projects with extended warranties

This course is held at the Ortronics and Legrand North America headquarters locations and will include a tour of the Legrand Customer Experience Center. Course participation is limited to Ortronics CIP-ESP and CIP Certified Contractors and end user customers with prior approval. 12 BICSI CECs received for successful completion. Course Certification is good for five years.

CONSULTANT AND DESIGNER TRAINING

Legrand Design Professional (LDP) Consultant Seminars: LDP seminars are designed specifically for Architects, Designers, Engineers and Technology Consultants and designed to empower participants to deliver high quality, leading edge telecommunications system design and specification. The seminar will cover industry standards updates, emerging technology review and discussion, Layer Zero™ infrastructure considerations, and optical fiber and copper design, testing and installation best practices. 7 BICSI CECs received for successful completion

If you would like additional information please contact your local Ortronics sales representative or you may call the Ortronics Training and Technology Department at (INT) + 1 (860) 405-2988.